PREFACE

This service manual contains chief instructions in connection with service and maintenance of PGO TIGRA motorcycle and is also one technical manual and one best guideline illustrating details for service workers who are engaged in maintenance, reparation, replacement of parts, troubleshooting, and reassembly. The service manual prepared from simple takedown to detailed disassembly and from performance introduction to service preparation provides complete instructions for general lubrication and routine check or adjustment. Explained with general views, exploded views, or photos, all necessary items repeatedly cited should be referred to the previous drawings and not further described in detail herein.

As a result of this service manual composed of directions for the following model, please check the model of your motorcycle among different ones in the manual for any contents available.

- **AF-125BAE: Four-Stroke Cycle, 125CC Level, 4-valve, water cooling, electronic injection engine**

The high-performance electronic fuel-injected water-cooling engine provided in this motorcycle is the up-to-date 125CC engine developed by Motive Power and being excellent in the engine kept within the optimal operating temperatures for high precision and the power output superior to that of a general air-cooling engine.

For any inadvertent mistakes attributed to preparation in a hurry, Motive Power Industry sincerely wish any person skilled in the art offer any comments.

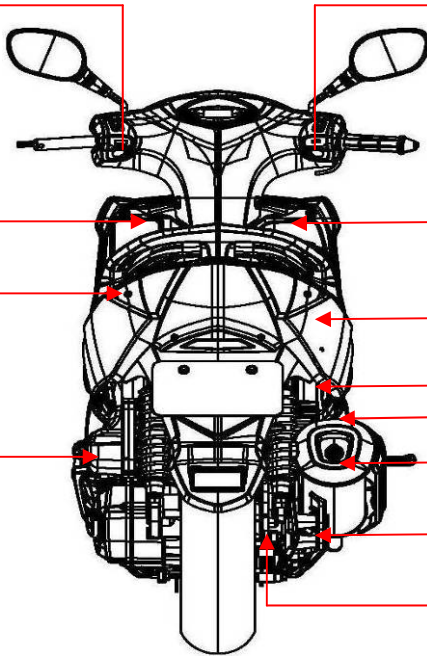
MOTIVE POWER INDUSTRY CO., LTD.

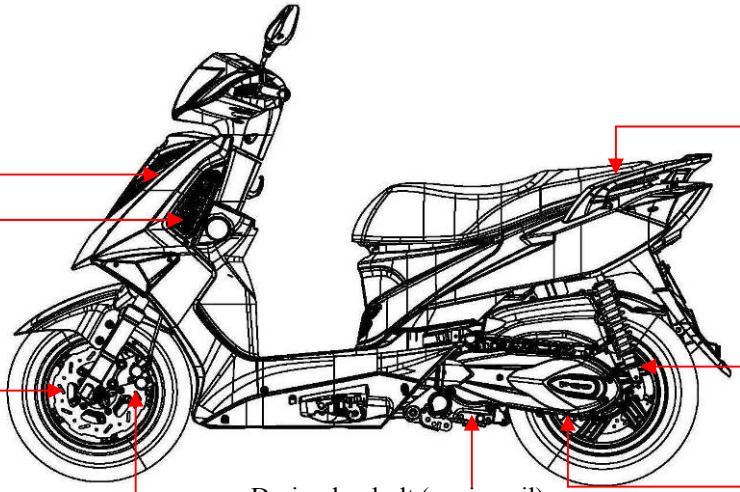
Contents

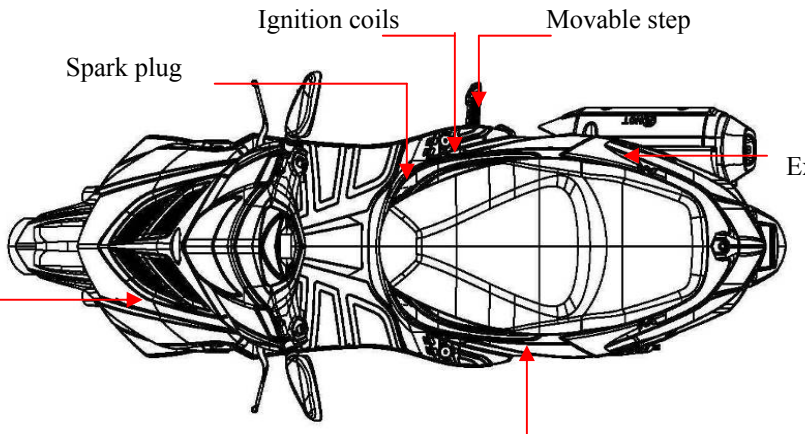
This manual is a service manual for PGO Tigra Series with details specifying skills to disassemble or install various mechanisms, basic maintenance (check and adjustment) of components, notices for operation, and configuration of colored electrical wires in connection with the motorcycle in which there are 5 chapters and 10 sections as references of users or mechanics during service.

Classification	Detail	Item	Page
Information summary and preparation	Specification, code of practice, torque meter, service instruction	1	1~22
External	Installation or removal of external components	2	23~28
Engine	Check & adjustment	3	29~39
	Lubrication system	4	40~42
	Disassembly of an engine	5	43~50
	Cooling system	6	51~58
	Fuel injection system	7	59~71
	Instructions of operating the diagnosis system (PC version)	8	72~83
Exhaust system	Exhaust control system	9	84~86
Circuit diagrams	Index of circuits and colored wires for vehicle	10	87~88

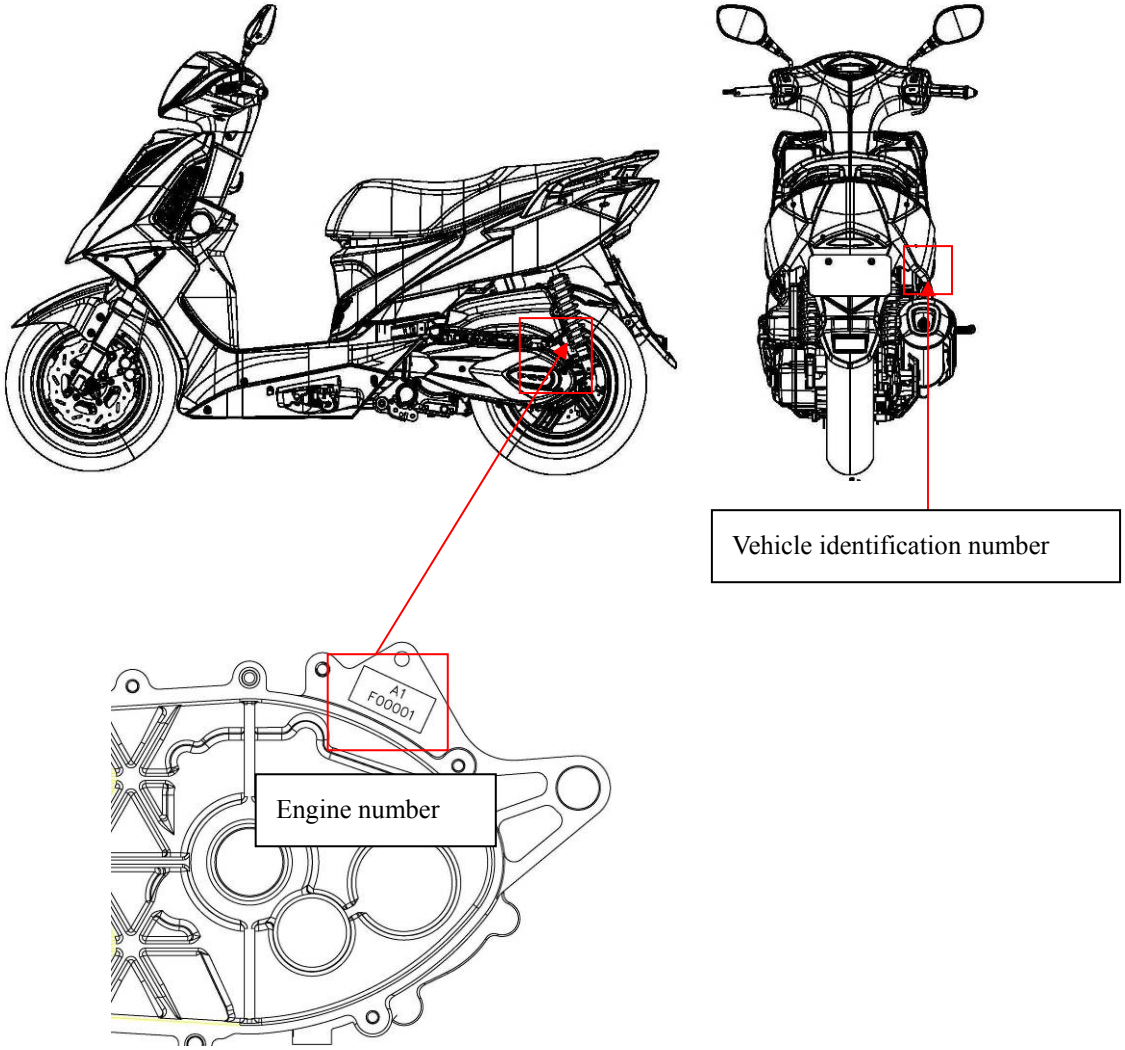
1-1 Configuration







1-2 Positions of engine number / vehicle identification number:



1-3 Specifications: (以下表格內容不需翻譯)

國 產 機 器 腳 踏 車 規 格 表								
廠 牌			摩 特 動 力	車 架 (身)			鋼 管	
型 式			AF-125BAE	懸 吊 裝 置		前	伸 縮 式	
尺 度	全 長		1865 mm			後	整體搖擺式	
	全 寬		710 mm	傳 動 裝 置	一次減速裝置		0.8~2.34	
	全 高		1140 mm		二次減速裝置		43/15*42/13=9.262	
	軸 距		1300 mm		離 合 器		乾式離心重錘式	
重 量	空重	前	48 kg		變 速 器		V 皮帶式 C.V.T	
		後	74 kg	輪胎尺寸及層數(p.r)		前	110/70-12	
		合 計	128 kg			後	130/70-12	
	乘坐人數或載重		2 人 (150 kg)	煞 車	前		碟 式	
					後		碟 式	
				燈光	前燈(遠. 近光)		12V-60W/55W	
性 能	最 高 速 率		105 km/hr		後燈/牌照燈		12V-0.4W/12V-5W	
	耗 油 率		42 km/L		煞 車 燈		12V-2W	
	爬 坡 能 力		26°以上		方向燈(前/後)		12V-2W/12V-2W	
引 擎	型 式		A1	喇 叭			直流 12V	
	使 用 燃 料		95 無鉛汽油	消 音 器			密閉擴散吸收式	
	循環數及冷卻方式		四行程水冷	排氣放濃廢度	粒狀污染物		15 %以下	
	汽缸	內 徑	φ52.4 mm		一氧化碳		3.0%以下	
		行 程	57.8 mm		碳氫化合物		1600 ppm 以下	
		缸數及排列	單 缸	排氣口位置及方向			後架下引擎右側朝後	
	總 排 氣 量		124.6 c.c.	潤 滑 方 式			壓 送 飛 濺 並 用	
	壓 縮 比		11: 1	E. E. C.			有	
	最 大 馬 力		*	P. C. V.			有	
	最 大 扭 力		*	觸 媒			有	
	安裝位置及方式		座墊下水平式	汽 油 箱 容 量			6.8 公升	
	點 火 方 式		電晶體電子點火					
	起 動 方 式		電動起動					
備註	1. 銷售名稱: TIGRA							

1-4 Code of practice:

1. Any clamp or cotter pin removed shall be replaced with a new one.
2. Any part to be replaced shall be manufactured by Motive Power.
3. Make sure of any assembled component securely fastened and formally activated.
4. Any bolts or nuts with large external diameters rather than small ones shall be screwed first and diagonally according to rated torque values as follows.
5. Any mechanic shall use specific or common tools for any disassembly and wear work shoes during maintenance.
6. The safety of any maintenance operation practiced by two mechanics shall be ensured each other.
7. Any electrical parts slightly heated with the motorcycle started are normal and not touched by hands directly.
8. Please keep any cable or wire harness to be installed properly fixed but not excessively tensioned or loosened without any acute (or sharp) angle or bulged bolt (or screw) piercing a cable. Check any cable or wire harness installed for any unnecessary twist or kink.
9. Do not put any tool on the motorcycle, particularly the battery unit to become a short circuit, during maintenance.
10. The battery in a motorcycle which has not been started for a long period shall be tested once to ensure its voltages and charged per month.
11. Please follow the correct steps to connect and disconnect a lead acid battery without the short circuit or inflammation.

1-4-1 Directions for maintenance of the Engine Management System (EMS)

1) Directions for General Maintenance

Any check to the Electronic Management System shall be made with a multi-meter only.

1. To make sure of the Electronic Management System properly running, please use parts supplied by Motive Power during maintenance.
2. Any operation to clean parts during maintenance shall be executed in a well-ventilated place.
3. Please follow the directions for steps of maintenance and diagnosis.
4. Do not disassemble or remove parts in the Electronic Management System during maintenance.
5. Please keep watch for any electronic element (electronic control unit, sensor, etc.) not fallen to the ground during maintenance; establish the environmental protection concept for any waste from maintenance invalidly disposed.

2) Directions during maintenance

1. Do not arbitrarily remove any part or connector of the Electronic Management System from its initial position; avoid any accidental damage or foreign object such as water and greasy dirt to enter into any connector and affect a properly running Electronic Management System.
2. In order to prevent any electrical device from damage, the power supply shall be disconnected

prior to a connector removed or connected.

3. During any operation to simulate the thermal state of one defective unit or increase temperatures, the temperature of the electronic control unit shall be less than 80 degrees Celsius.
4. All fuel hoses shall be high pressure-tolerant pipes in virtue of the high fuel pressure in the Electronic Management System (300kPa or so) or even at the engine stopped. As a result, the fuel hose during maintenance shall not be disassembled arbitrarily. In the case of maintaining the fuel system, the pressure in the fuel system shall be released prior to removal of a fuel hose shown as follows: Remove the fuel pump relay; start the engine; keep the engine at the idle speed until the engine stops. **The operation of removal of a fuel hose and replacement of a clamp shall be executed by a professional mechanic in a well-ventilated place.**
5. The power supplied to the electric fuel pump which is being removed from the fuel tank shall be disconnected beforehand to prevent any spark or fire.
6. The fuel pump to be tested shall not be empty or refilled by water or the service life will be curtailed. On the other hand, the positive and negative poles of the fuel pump shall be properly connected.
7. Unless otherwise required, the spark test shall not be conducted or be completed quickly during inspections of the ignition system. Additionally, the air throttle shall be kept closed during inspections or the incompletely ignited gasoline will be fed into the exhauster and damage the three-way catalytic converter.
8. The idle speed has been adjusted by the Electronic Management System in advance and not changed manually. The initial position of the throttle stop screw adjusted by Motive Power shall not be changed by a user without permission unless otherwise demanded.
9. The cables to be connected to the positive and negative poles on a battery shall be correctly linked or the electronic devices will be damaged. The **minus earth** is used in the system.
10. Any cable connected to a battery shall not be disconnected during the engine running.
11. The battery shall be removed from the motorcycle for a charge separately conducted but not be directly charged with the battery fixed on the vehicle for convenience.
12. The cables connected to the battery's positive & negative poles and the electronic control unit shall be removed from the motorcycle prior to any electrical welding operation.
13. Do not cut a cable's cover layer to test any signal imported to or exported from one device.

1-5 Torque

Rated values

Type	Torque (kg-m)	Type	Torque (kg-m)
5mm bolt	0.4~0.5kg-m	6mm nut	1.0~1.4kg-m
6mm bolt	0.9~1.1kg-m	8mm nut	2.0~3.0kg-m
8mm bolt	1.8~2.5kg-m	10mm nut	3.0~4.0kg-m
10mm bolt	3.0~4.0kg-m	Pin / bolt	1.5~2.0kg-m
12mm bolt	5.0~6.0kg-m		

Body / Engine

Type	Torque (kg-m)	Type	Torque (kg-m)	Type	Torque (kg-m)
Disk	2.0-2.5	Flywheel	5.0-6.0	Handlebar	4.5-6.0
Front axle	5.0-6.0	Cylinder head - nut	2.0-2.4	Engine hanger	2.4-3.0
Brake caliper	2.0-3.0	Cylinder head - screw	0.9-1.1	Front shock absorber	
Joint bolt (brake hose)	3.5±0.2	Crank case cover (right)	0.9-1.1	Rear shock absorber	3.5-4.5
Brake pump assembly	0.8-1.2	Gear box nut	5.0-6.0	Exhauster (Front)	1.5-1.8
Drain plug bolt (engine oil)	1.2-1.8	Rear axle	10.0-11.0	Exhauster (Rear)	3.0-3.5
Drain plug bolt (gear oil)	2.5-3.0	Camshaft sprocket	2.2±0.2	Rear fork	3.0-3.5
Oil screen cover	1.5-2.0	Cylinder head cover	1.0-1.2	Oxygen sensor	4.0-6.0
Fixed rotor	0.9-1.1	Oil pump	0.9-1.1	Left side cover	0.9-1.1
Crank angle sensor	0.7-0.9	Flywheel & one-way clutch	2.8-3.2	Center stand	3.5-4.0
Drive propeller (water pump)	1.0-1.4	Gear box	2.5-2.8	Support (Center stand)	2.5-2.8
Engine temperature sensor	1.53	Stud bolt (cylinder head)	0.9-1.1	Leaking bolt (brake caliper)	
Temperature controller	0.9-1.1	Crank case (left & right)	0.9-1.1		

1-6 Service tools

◆ Summary of service tools

■ **Tool name: Electronic Management System diagnosis tester (EMS diagnosis system)**

Functions: Read / delete PCODE of EMS; check data & process, and test parts' functions.

■ **Tool name: Fuel pressure gauge**

Functions: Check pressures of the fuel system; determine status of the fuel pump and the fuel pressure governor in the fuel system.

■ **Tool name: Multi-meter**

Functions: Check voltage, current, and resistance of EMS.

■ **Tool name: Cylinder pressure gauge**

Functions: Check each cylinder's pressure.

■ **Tool name: Leak detector (water cooling system)**

Functions: Test any leakage of the water cooling system to keep the system well sealed.

■ **Tool name: Flywheel withdrawal kit**

Functions: Disassemble the flywheel assembly

■ **Tool name: Water pump shaft SC seal kit**
Functions: Install SC seals on the water pump shaft

■ **Tool name: Mechanical seal kit**
Functions: Install the mechanical seal.

■ **Tool name: Crank bearing withdrawal kit**
Functions: Disassemble and separate the crank bearing.

■ **Tool name: Snap-fit kit**
Functions: Remove or install a snap-fit of the cooling water hose or high-pressure fuel hose

■ **Tool name: Crank extraction kit**
Functions: Extract the crank from the case.

■ **Tool name: Crank installation kit**
Functions: Install the crank on the case.

1-7 Procedure to maintain the Electronic Management System (EMS)

■ **Systematic procedure to diagnose any troubles for reparation**

Items to be checked first prior to any diagnoses for engine troubles:

1. Make sure of the engine trouble indicator normally running;
2. Check with a trouble diagnosis meter to ensure no trouble information recorded;
3. Check any trouble phenomenon hinted by the vehicle owner and trouble-related conditions.

External check:

(1) Check any leakage from a fuel hose.
(2) Check any leakage from a vacuum pipe.
(3) Check any jam, leakage, flattening, or damage at an air inlet.
(4) Check the ignition system for break or aging of any high-voltage cable and ignition status.
(5) Check grounding of any wire harness clean and securely fixed.
(6) Check any sensor or actuator's connector loosened or poorly contacted.

Note: Repair any trouble specified herein first which may affect the subsequent diagnoses or reparation.

■ **Diagnosis assist:**

1. Make sure of no engine-related trouble records;
2. Make sure of any offered troubles;
3. Follow the said procedure to complete inspections and find no any unconformable situation;
4. Do not ignore any effect from maintenance, cylinder pressure, mechanical timing, or fuel on the system;
5. Replace ECU for tests.

In the event of any trouble eliminated, ECU should be the source of trouble; if not, install the original ECU and repeat the procedure to recheck.

■ **Trouble:**

- Engine not running or slowly running during start-up
- Engine running but start-up failing during start-up
- Trouble of hot start
- Trouble of cold start
- Trouble of start-up anytime despite RPM normal
- Start-up normal but idle speed unstable anytime
- Start-up normal but idle speed unstable during warm-up
- Start-up normal but idle speed unstable with warm-up finished
- Start-up normal but idle speed unstable or stall with load such as front lamp applied
- Start-up normal but idle speed too high
- RPM low or stall during acceleration
- Acceleration slow
- Acceleration powerless; performance bad

(1) Engine not running or slowly running during start-up

General trouble location: 1. Battery; 2. Start motor; 3. Main wiring or power switch; 4. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check the voltage between two battery terminals with a multi-meter to ensure the voltage between 11 and 12V during start-up of the engine.	Yes	Next step
		No	Replace the battery.
2	Keep the power switch "ON" and check the voltage at the positive terminal on the start motor over 8V.	Yes	Next step
		No	Fix or replace wiring harness.
3	Remove the start motor and check its status for open circuits or jam attributed to lubrication insufficient.	Yes	Fix or replace the start motor.
		No	Next step
4	For any trouble in winter only, check lubricant in the engine wrong for big resistance of the start motor.	Yes	Change applicable lubricant.
		No	Next step
5	Check mechanical resistance inside the engine causing the motor not running or slowly running.	Yes	Correct resistance inside the engine.
		No	Repeat the said step.

(2) Engine running but start-up failing during start-up

General trouble location: 1. Oil tank empty; 2. Fuel pump; 3. RPM sensor; 4. Ignition coils; 5. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Connect a fuel pressure gauge before the fuel inlet of the nozzle; press the power switch repeatedly if necessary or start the engine to check the fuel pressure at 300kPa or so.	Yes	Next step
		No	Repair the fuel supply system.
2	Connect the EMS diagnosis tester and check "Engine RPM"; start the engine to check any **RPM signal output.**	Yes	Next step
		No	Correct circuits of the RMP sensor.
3	Disconnect the ignition cable and connect a spark tester; start the engine and check any high-voltage flash (blue/white).	Yes	Next step
		No	Repair the ignition system.
4	Check pressure of the engine cylinder and find any possibility of pressure insufficient.	Yes	Eliminate any mechanical trouble of the engine.
		No	Next step
5	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(3) Trouble of hot start

General trouble location: 1. Water in fuel; 2. Fuel pump; 3. Engine temperature sensor; 4. Ignition coils

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Connect a fuel pressure gauge before the fuel inlet of the nozzle; start the engine to check the fuel pressure at 300kPa or so.	Yes	Next step
		No	Repair the fuel supply system.
2	Disconnect the ignition cable and connect a spark tester; start the engine and check any high-voltage flash (blue/white).	Yes	Next step
		No	Repair the ignition system.
3	Press the engine temperature sensor connector and start the engine; check if the engine successfully started. (Or **install a series-connected resistor (300Ω) in lieu of the engine temperature sensor at the engine temperature sensor connector.** Check if the engine is successfully started.)	Yes	Correct circuits or replace the sensor.
		No	Next step
		No	Next step
4	Check fuel and observe any trouble attributed to fuel just added.	Yes	Replace fuel.
		No	Next step
5	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(4) Trouble of cold start

General trouble location: 1. Water in fuel; 2. Fuel pump; 3. Engine temperature sensor; 4. Nozzle; 5. Ignition coils; 6. Air throttle and & idle air bypass; 7. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Connect a fuel pressure gauge before the fuel inlet of the nozzle; start the engine to check the fuel pressure at 300kPa or so.	Yes	Next step
		No	Repair the fuel system.
2	Disconnect the ignition cable and connect a spark tester; start the engine and check any high-voltage flash (blue/white).	Yes	Next step
		No	Repair the ignition system.
3	Press the engine temperature sensor connector and start the engine; check if the engine successfully started. (Or **install a series-connected resistor (2500Ω) in lieu of the engine temperature sensor at the engine temperature sensor connector.** Observe if the engine is successfully started.)	Yes	Correct circuits or replace any sensor.
		No	Next step
4	Slightly pull the throttle to check if the engine is easily started.	Yes	Clean the air throttle and the idle air bypass.
		No	Next step
5	Disassemble the nozzle and check any leakage or jam in the nozzle with a nozzle cleaner & analyzer.	Yes	Replace the defective nozzle.
		No	Next step
6	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
7	Check pressure of the engine cylinder and find any possibility of pressure insufficient.	Yes	Eliminate any mechanical trouble of the engine.
		No	Next step
8	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(5) Trouble of start-up anytime despite RPM normal

General trouble location: 1. Water in fuel; 2. Fuel pump; 3. Engine temperature sensor; 4. Nozzle; 5. Ignition coils; 6. Air throttle and & idle air bypass; 7. Air intake; 8. Ignition timing; 9. Spark plug; 10. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check any jam of the air filter and leakage of the air intake.	Yes	Repair the air intake system.
		No	Next step
2	Connect a fuel pressure gauge before the fuel inlet of the nozzle; start the engine to check the fuel pressure at 300kPa or so.	Yes	Next step
		No	Repair the fuel supply system.
3	Disconnect the ignition cable and connect a spark tester; start the engine and check any high-voltage flash (blue/white).	Yes	Next step
		No	Repair the ignition system.
4	Check the spark plug in the cylinder and its model and gap conformable to specifications.	Yes	Next step
		No	Adjust or change the spark plug.
5	Press the engine temperature sensor connector and start the engine; check if the engine is successfully started.	Yes	Correct circuits or replace the sensor.
		No	Next step
6	Slightly pull the throttle to check if the engine is easily started.	Yes	Clean the air throttle and the air intake for idle speed.
		No	Next step
7	Disassemble the nozzle and check any leakage or jam in the nozzle with a nozzle cleaner & analyzer.	Yes	Change the defective nozzle.
		No	Next step
8	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
9	Check pressure of the engine cylinder and find any possibility of pressure insufficient.	Yes	Eliminate any mechanical trouble of the engine.
		No	Next step
10	Check if mechanical ignition timing of the engine is conformable to specifications.	Yes	Next step
		No	Correct ignition timing.
11	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(6) Start-up normal but idle speed unstable anytime

General trouble location: 1. Water in fuel; 2. Nozzle; 3. Spark plug; 4. Air throttle and idle air bypass; 5.Air intake; 6. Idle governor; 7. Ignition timing; 8. Spark plug; 9. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check any jam of the air filter and leakage of the air intake.	Yes	Repair the air intake system.
		No	Next step
2	Check the Idle governor for the control valve jammed.	Yes	Change
		No	Next step
3	Check the spark plug and its model and gap conformable to specifications.	Yes	Next step
		No	Adjustment or change
4	Check the air throttle and the idle air bypass for any carbon deposition.	Yes	Cleaning
		No	Next step
5	Disassemble the nozzle and check any leakage or jam in the nozzle with a nozzle cleaner & analyzer.	Yes	Replace the defective nozzle.
		No	Next step
6	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
7	Check pressure of the engine cylinder and find any big difference in pressure.	Yes	Eliminate any mechanical trouble of the engine.
		No	Next step
8	Check if mechanical ignition timing of the engine is conformable to specifications.	Yes	Next step
		No	Correct ignition timing.
9	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(7) Start-up normal but idle speed unstable during warm-up

General trouble location: 1. Water in fuel; 2. Engine temperature sensor; 3. Spark plug; 4. Air throttle and idle air bypass; 5. Air intake; 6. Idle governor; 7. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check any jam of the air filter and leakage of the air intake.	Yes	Repair the air intake system.
		No	Next step
2	Check the spark plug and its model and gap conformable to specifications.	Yes	Next step
		No	Adjustment or change
3	Remove the Idle governor and check the air throttle, the idle governor, and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
4	Press the engine temperature sensor connector and start the engine to check any instability of the idle speed during warm-up of the engine.	Yes	Correct circuits or replace any sensor.
		No	Next step
5	Disassemble the nozzle and check the nozzle leaking or blocked, or the flow out of tolerance with a nozzle cleaner & analyzer.	Yes	Change the defective nozzle.
		No	Next step
6	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
7	Check pressure of the engine cylinder and find any big difference in pressure.	Yes	Eliminate any mechanical trouble of the engine.
		No	Next step
8	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#,** and **23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(8) Start-up normal but idle speed unstable with warm-up finished

General trouble location: 1. Water in fuel; 2. Engine temperature sensor; 3. Spark plug; 4. Air throttle and idle air bypass; 5. Air intake; 6. Idle governor; 7. Engine mechanism.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check any jam of the air filter and leakage of the air intake.	Yes	Repair the air intake system.
		No	Next step
2	Check the spark plug and its model and gap conformable to specifications.	Yes	Next step
		No	Adjustment or change
3	Remove the idle governor and check the air throttle, the idle governor, and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
4	Press the engine temperature sensor connector and start the engine to check any instability of the idle speed during warm-up of the engine.	Yes	Correct circuits or replace any sensor.
		No	Next step
5	Disassemble the nozzle and check the nozzle leaking or blocked, or the flow out of tolerance with a nozzle cleaner & analyzer.	Yes	Change the defective nozzle.
		No	Next step
6	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
7	Check pressure of the engine cylinder and find any big difference in pressure.	Yes	Eliminate any mechanical trouble of the engine.
		No	Next step
8	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(9) Start-up normal but idle speed unstable or stall with load such as front lamp applied

General trouble location: 1. Idle governor; 2. Nozzle.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Remove the idle governor and check the air throttle, the idle governor, and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
2	Check if the engine's output power is increased with the load applied; use the EMS diagnosis tester to check any change in the ignition advance angle, duration of fuel injection, and air input.	Yes	Go to Step 4.
		No	Next step
		No	Repair the air regulating system.
3	Disassemble the nozzle and check the nozzle leaking or blocked, or the flow out of tolerance with a nozzle cleaner & analyzer.	Yes	Change the defective nozzle.
		No	Next step
4	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(10) Start-up normal but idle speed too high

General trouble location: 1. Air throttle and idle air bypass; 2. Vacuum tube; 3, Idle governor; 4. Engine temperature sensor; 5. Ignition timing.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check the throttle cable for jammed or too tight.	Yes	Adjustment
		No	Next step
2	Check the air intake system and the connected vacuum tube for any leakage.	Yes	Repair the air intake system.
		No	Next step
3	Remove the idle governor to check the air throttle, the idle governor and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
4	Press the engine temperature sensor connector and start the engine; check if the engine's the idle speed is too high.	Yes	Correct circuits or replace any sensor.
		No	Next step
5	Check if mechanical ignition timing of the engine is conformable to specifications.	Yes	Next step
		No	Correct ignition timing.
6	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(11) RPM low or stall during acceleration

General trouble location: 1. Water in fuel; 2. Inlet pressure sensor & air throttle sensor; 3, Spark plug; 4. Air throttle & idle air bypass; 5. Air intake; 6. Idle governor; 7. Nozzle; 8. Ignition timing; 9. Exhauster.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check the air filter for any jam.	Yes	Check the air intake system.
		No	Next step
2	Connect a fuel pressure gauge before the fuel inlet of the nozzle; start the engine to check the fuel pressure at 300kPa or so during the idle status.	Yes	Next step
		No	Repair the fuel supply system.
3	Check the spark plug in the cylinder and its model and gap conformable to specifications.	Yes	Next step
		No	Adjustment or replacement
4	Remove the idle governor to check the air throttle, the idle governor and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
5	Check the inlet pressure sensor, the air throttle and circuits.	Yes	Next step
		No	Correct circuits or replace any sensor.
6	Disassemble the nozzle and check any leakage or jam in the nozzle with a nozzle cleaner & analyzer.	Yes	Replace the defective nozzle.
		No	Next step
7	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
8	Check if ignition timing of the engine is conformable to specifications.	Yes	Next step
		No	Correct ignition timing.
9	Check the exhauster for exhaust normally discharged.	Yes	Next step
		No	Repair or replace the exhauster.
10	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(12) Acceleration slow

General trouble location: 1. Water in fuel; 2. Inlet pressure sensor and air throttle sensor; 3. Spark plug; 4. Air throttle and idle air bypass; 5. Air intake; 6. Idle governor; 7. Nozzle; 8. Ignition timing; 9. Exhauster.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check the air filter for any jam.	Yes	Check the air intake system.
		No	Next step
2	Connect a fuel pressure gauge before the fuel inlet of the nozzle; start the engine to check the fuel pressure at 300kPa or so during the idle status.	Yes	Next step
		No	Repair the fuel supply system.
3	Check the spark plug in the cylinder and its model and gap conformable to specifications.	Yes	Next step
		No	Adjustment or replacement
4	Remove the idle governor to check the air throttle, the idle governor and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
5	Check the inlet pressure sensor, the air throttle sensor and circuits.	Yes	Next step
		No	Correct circuits or replace any sensor.
6	Disassemble the nozzle and check any leakage or jam in the nozzle with a nozzle cleaner & analyzer.	Yes	Replace the defective nozzle.
		No	Next step
7	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
8	Check if the engine's ignition timing is conformable to specifications.	Yes	Next step
		No	Correct ignition timing.
9	Check the exhauster for exhaust normally discharged.	Yes	Next step
		No	Repair or replace the exhauster.
10	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

(13) Acceleration powerless; performance bad

General trouble location: 1. Water in fuel; 2. Inlet pressure sensor and air throttle sensor; 3. Spark plug; 4. Ignition coils; 5. Air throttle and idle air bypass; 6. Air intake; 7. Idle governor; 8. Nozzle; 9. Ignition timing; 10. Exhauster.

Procedure for general diagnoses:

No.	Operating Procedure	Detection Results	Subsequent Steps
1	Check any troubles such as clutch slip, low tire pressure, brake drag, wrong tire size.	Yes	Reparation
		No	Next step
2	Check the air filter for any jam.	Yes	Repair the air intake system.
		No	Next step
3	Connect a fuel pressure gauge before the fuel inlet of the nozzle; start the engine to check the fuel pressure at 300kPa or so during the idle status.	Yes	Next step
		No	Repair the fuel supply system.
4	Disconnect the ignition cable and connect a spark tester; start the engine and check any high-voltage flash (blue/white).	Yes	Next step
		No	Repair the ignition system.
5	Check the spark plug in the cylinder and its model and gap conformable to specifications.	Yes	Next step
		No	Adjustment or replacement
6	Remove the idle governor to check the air throttle, the idle governor and the idle air bypass for any carbon deposition.	Yes	Clean relevant parts.
		No	Next step
7	Check the inlet pressure sensor, the air throttle sensor and circuits.	Yes	Next step
		No	Correct circuits or replace any sensor.
8	Disassemble the nozzle and check any leakage or jam in the nozzle with a nozzle cleaner & analyzer.	Yes	Replace the defective nozzle.
		No	Next step
9	Check fuel and observe any trouble attributed to fuel just added.	Yes	Change fuel.
		No	Next step
10	Check if the engine's ignition timing is conformable to specifications.	Yes	Next step
		No	Correct ignition timing.
11	Check the exhauster for exhaust normally discharged.	Yes	Next step
		No	Repair or replace the exhauster.
12	Connect an EMS adapter and press the power switch to check voltages at Pins **5#, 10#, and 23#**; check grounding at Pins **2#** and **21#.**	Yes	Diagnosis assist
		No	Repair the relevant circuits.

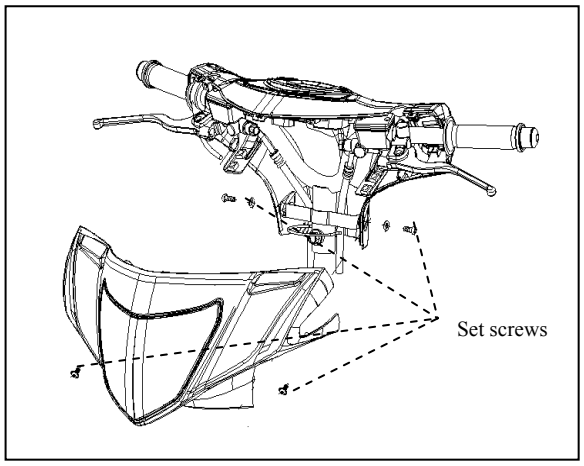
1) PCODE List

No.	PCODE	UAES	Description
1	P0107	Inlet pressure sensor to GND short-circuited	Manifold Abs.Pressure or Bar.Pressure Low Input
2	P0108	Inlet pressure sensor to power supply short-circuited	Manifold Abs.Pressure or Bar.Pressure High Input
3	P0112	Low voltage of the signal for the air inlet temperature sensor	Intake Air Temp.Circ. Low Input
4	P0113	High voltage of the signal for the air inlet temperature sensor	Intake Air Temp.Circ. High Input
5	P0117	Low voltage of the engine temperature sensor	Engine Coolant Temp.Circ. Low Input
6	P0118	High voltage of the engine temperature sensor	Engine Coolant Temp.Circ. High Input
7	P0122	Voltage of the air throttle sensor less than the lower limit	Throttle Pos.Sensor Circ. Low Input
8	P0123	Voltage of the air throttle sensor greater than the higher limit	Throttle Pos.Sensor Circ. High Input
9	P0130	Signal of the oxygen sensor irrational	O2 Sensor Circ. Malfunction
10	P0131	Low voltage of the signal for the oxygen sensor	O2 Sensor Circ. Low Voltage
11	P0132	High voltage of the signal for the oxygen sensor	O2 Sensor Circ. High Voltage
12	P0134	Signal of the oxygen sensor wrong	O2 Sensor Circ. No Activity Detected
13	P0201	Nozzle control circuits opened	Cylinder 1- Injector Circuit
14	P0261	Nozzle control circuits to GND short-circuited	Cylinder 1- Injector Circuit Low
15	P0262	Nozzle control circuits to power supply short-circuited	Cylinder 1- Injector Circuit High
16	P0321	Reference mark of the RPM signal wrong	Engine Speed Reference Mark
17	P0322	No pulse signal of the RMP sensor (Open or short circuit)	Eng.Speed Inp.Circ. No Signal
18	P0508	Idle speed actuator (ISA) drive to GND short-circuited	ISA control Circuit Low
19	P0509	Idle speed actuator (ISA) drive to power supply short-circuited	ISA control Circuit High
20	P0511	ISA pin open	ISA control Circuit/Open
21	P0560	Battery voltage signal irrational	System Voltage Malfunction
22	P0562	System battery voltage too low	System Voltage Low Voltage
23	P0563	System battery voltage too high	System Voltage High Voltage
24	P0650	MIL drive circuits wrong	Malfunction Indicator Lamp Control Circ.

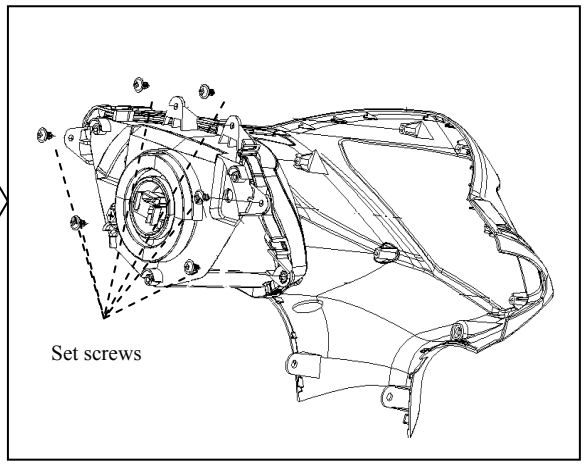
2) Refer to the **circuit diagrams** for any troubleshooting or maintenance.

Front & rear covers (handlebar)

1. Front cover → Front lamp assembly → Rear cover → Dashboard assembly → Left & right handlebar switch assembly



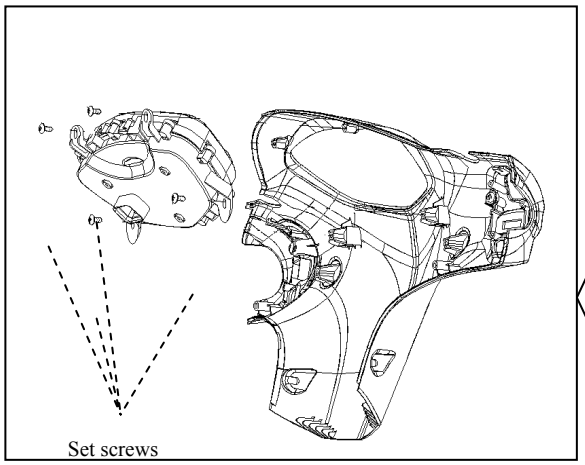
1



2

◙ Remove 4 set screws on the front cover.

◙ Remove 6 set screws on the front lamp.



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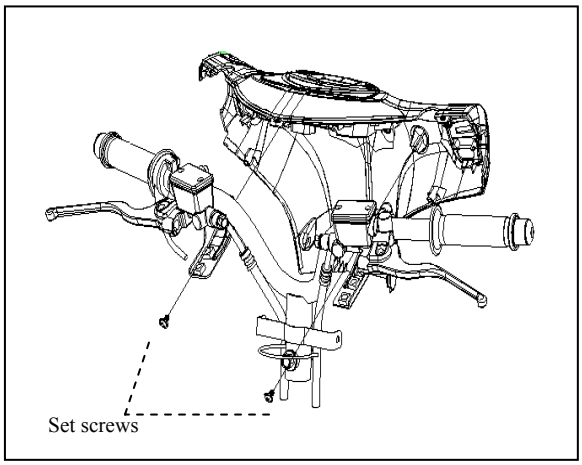
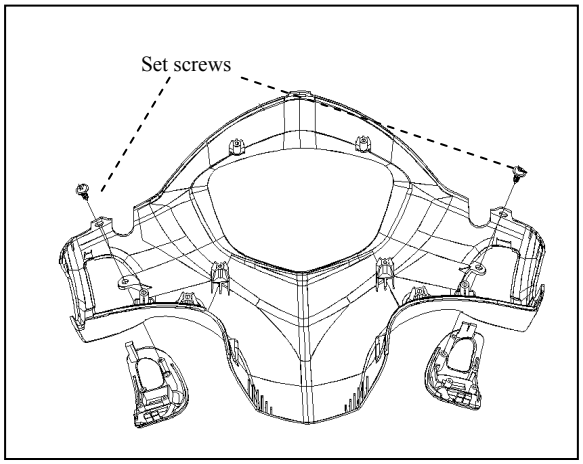


4

◙ Remove 4 set screws on the dashboard.

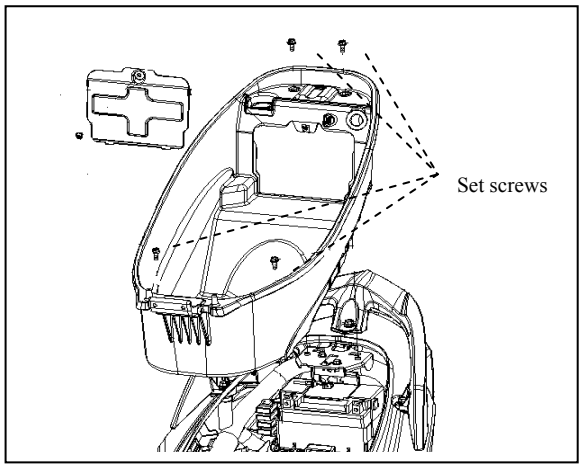
◙ Remove 2 set screws on the front cover.



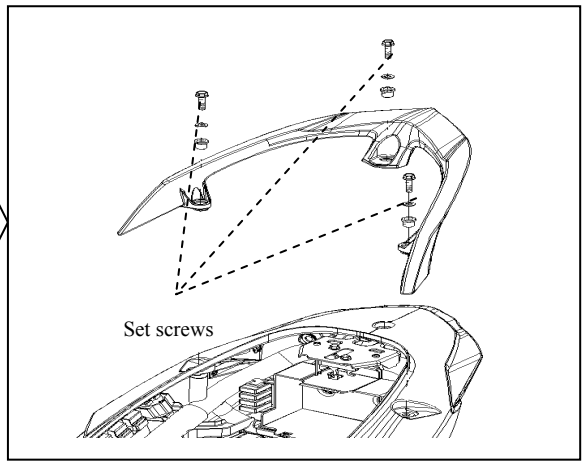
◙ Remove 2 set screws on the left & right handlebar switches.

Removal and installation of body cover & lower cover

2. Storage compartment → Luggage carrier → Front body cover → body cover assembly (left / right-hand side of the license plate) → Front lower cover → Lower cover

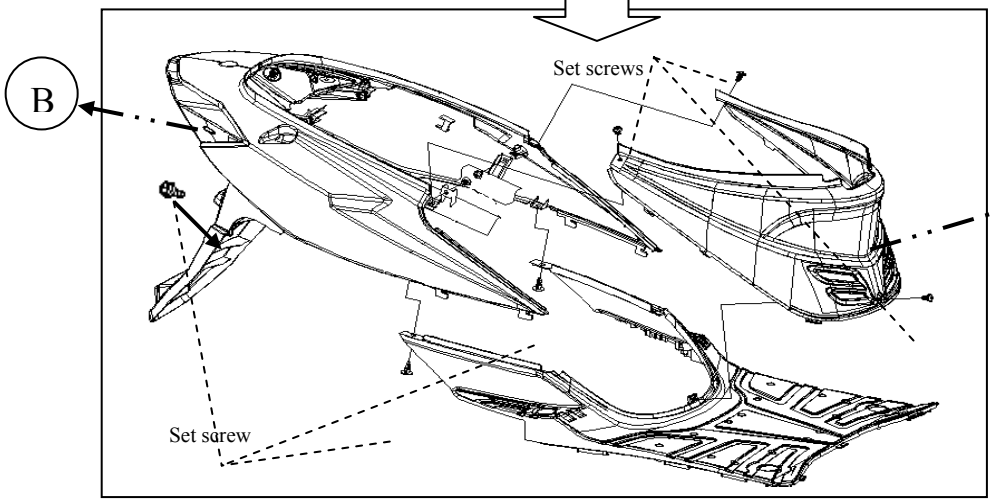


1



◙ Remove 4 set screws on the storage compartment. ◙ Remove 3 set screws on the rear luggage carrier.

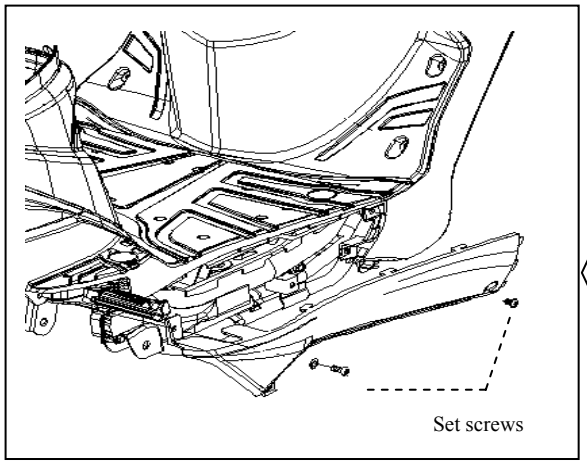
2



3

◙ Remove 3 set screws on the front body cover (A).

◙ Remove 5 set screws on the license plate and left & right body covers (B).



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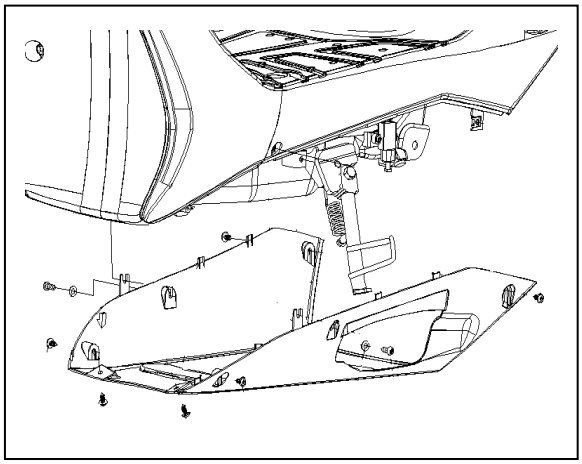
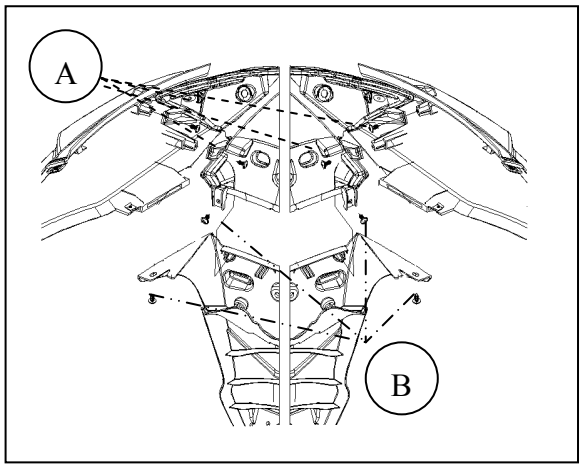
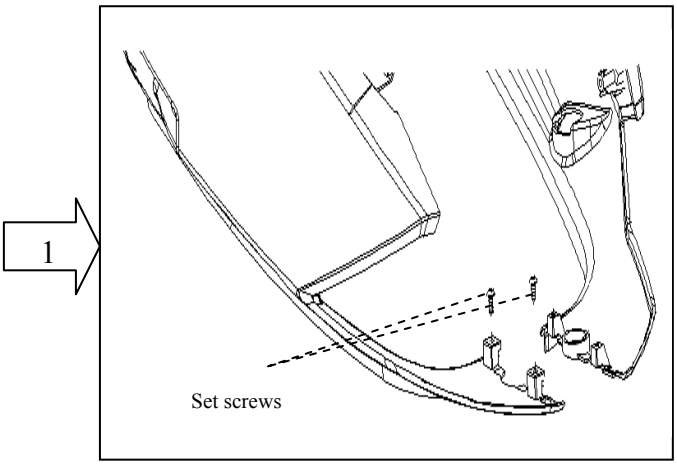


◙ Remove 6 set screws on the left & right lower covers. ◙ Remove 8 set screws on the front lower cover (B).

Removal of body cover and license plate

2-1 License plate and left & right body cover assembly → Left & right body covers → License plate → Lower sector → Reflector

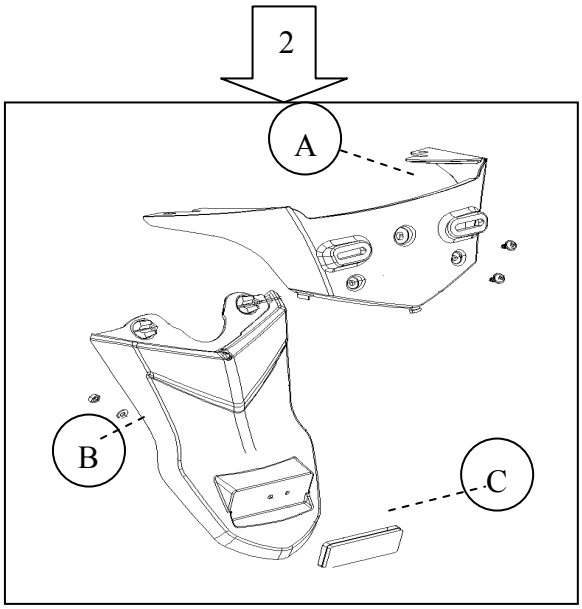




◙ Remove 4 set screws on the rear lamp and left & right body cover assembly (A).

◙ Remove 2 set screws on the left & right body covers.

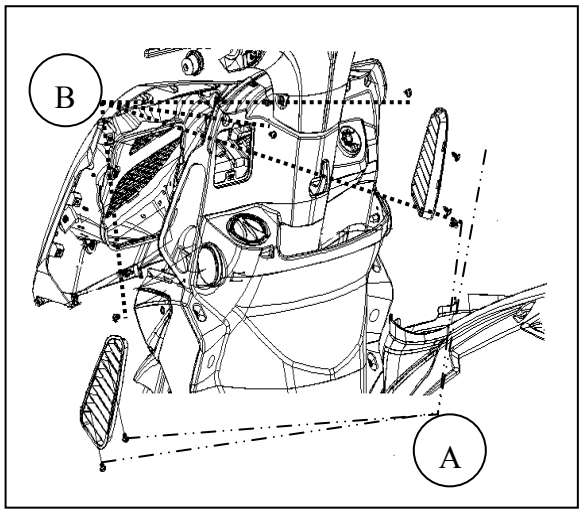
◙ Remove 4 set screws on the rear lamp & license plate assembly (B).



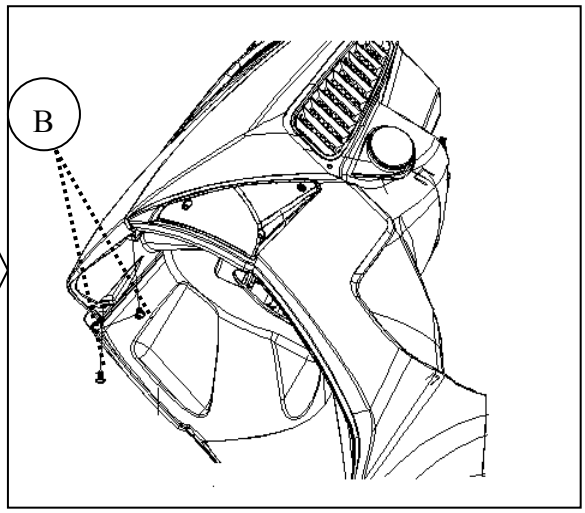
◙ Remove 2 set screws on the license plate and the lower sector

◙ Remove 1 set screw on the lower sector and the rear reflector

3. Left & right air breathers (front inner panel) → Windshield → Front air deflector cover (water tank) → Air deflector cover (Windshield) → Left & right signal lamp covers → Floor panel



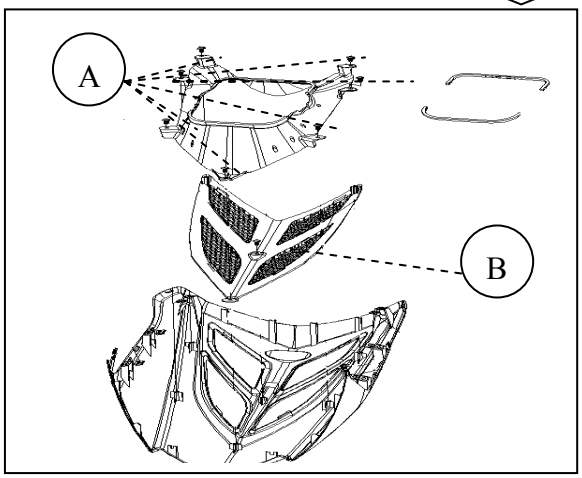
1



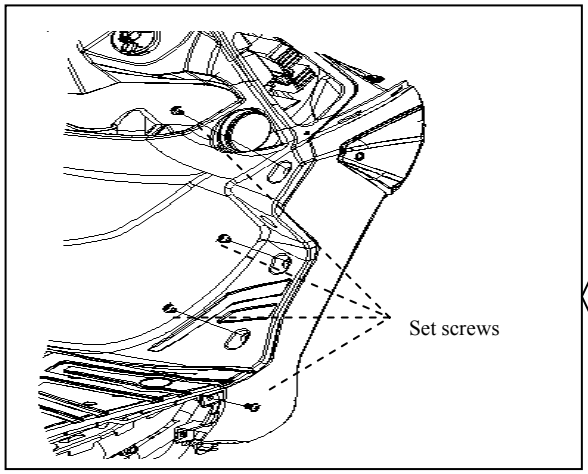
◙ Remove 4 set screws on the left & right air breathers (front inner panel) (A).

◙ Remove 6 set screws on the windshield (B).

2



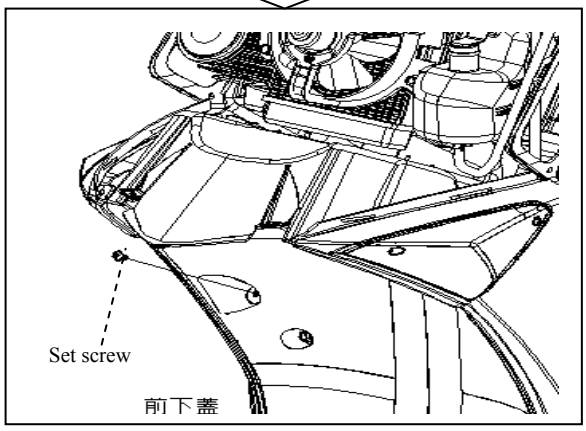
3



5

◙ Remove 7 set screws on the front air deflector cover (water tank) (A).

◙ Remove 1 set screw on the air deflector cover (windshield) (B).



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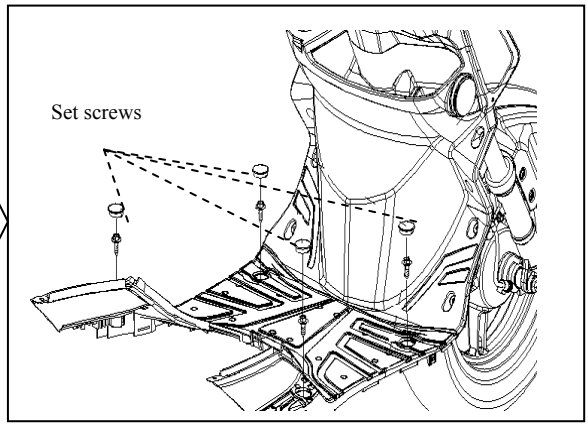
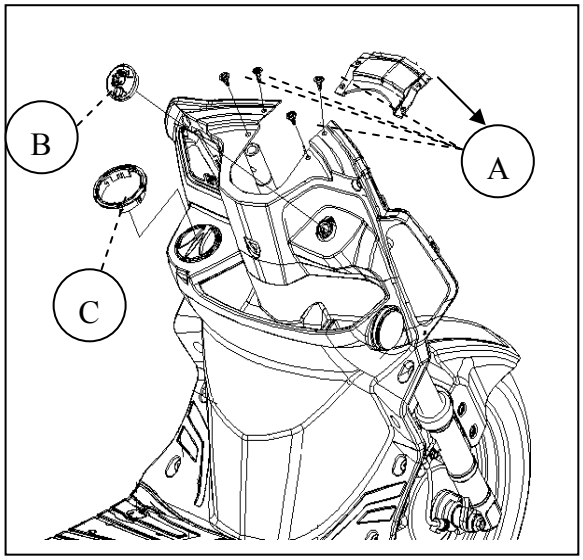
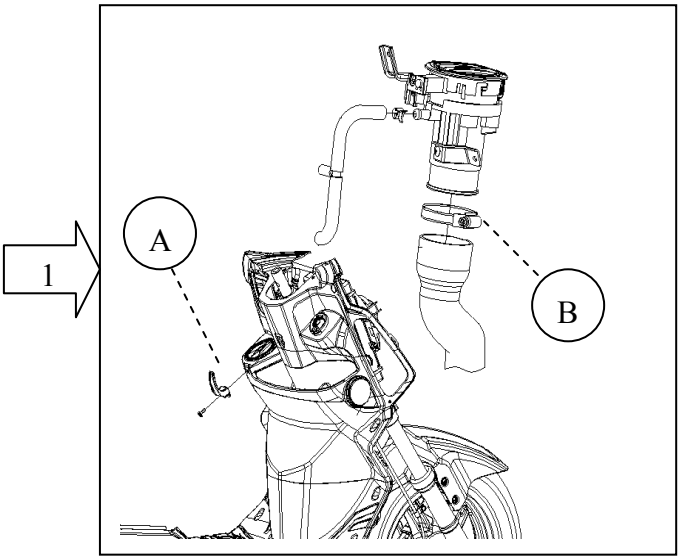


◙ Remove 10 set screws on left & right signal lamp covers.

◙ Remove 4 waterproof rubber plugs / set screws on the floor panel.

4. Front inner panel cover → Front inner panel

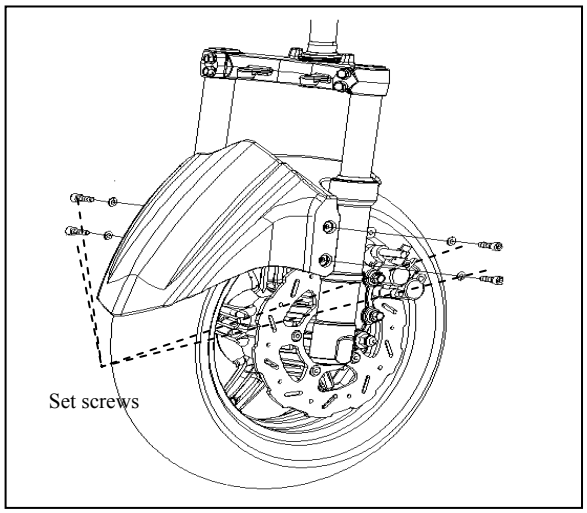


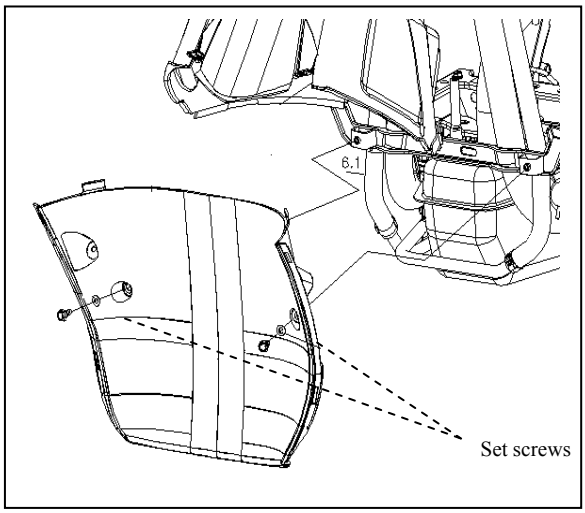


◙ Remove 4 speed rivets on the front inner panel (A).
◙ Remove 1 set screw on the secondary security lock (B).
◙ Remove the fuel tank cover counterclockwise (C).

◙ Remove 1 set screw on the front hook (A).
◙ Remove 1 set screw on the fuel hose bundle (B).

5. Front mud fender / Lower body cover

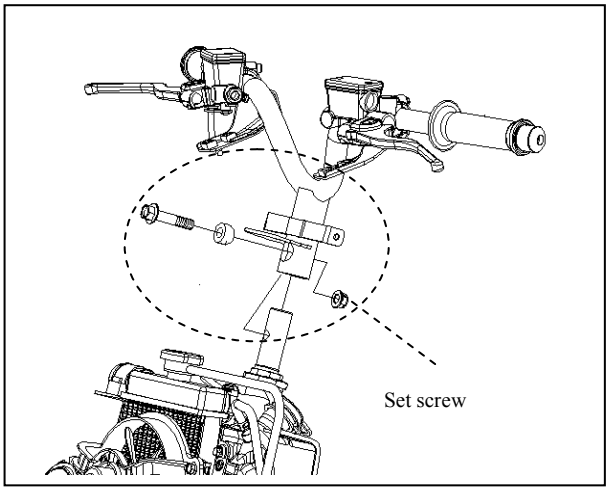




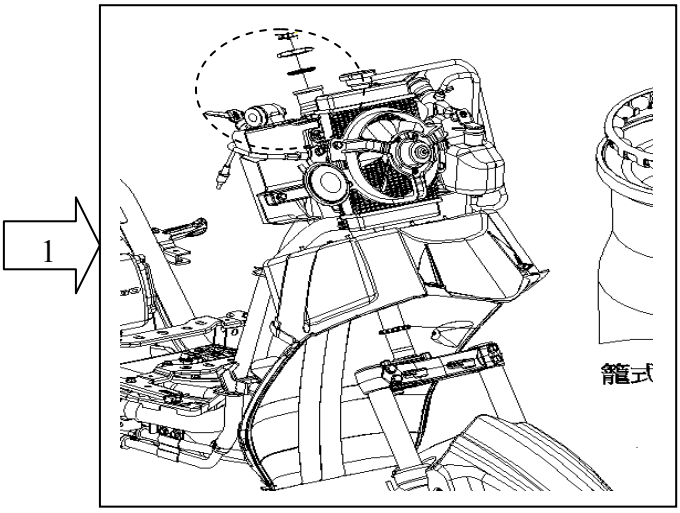
◙ Remove 4 set screws on the front mud fender.

◙ Remove 2 set screws on the lower body cover.

6. Front inner fender

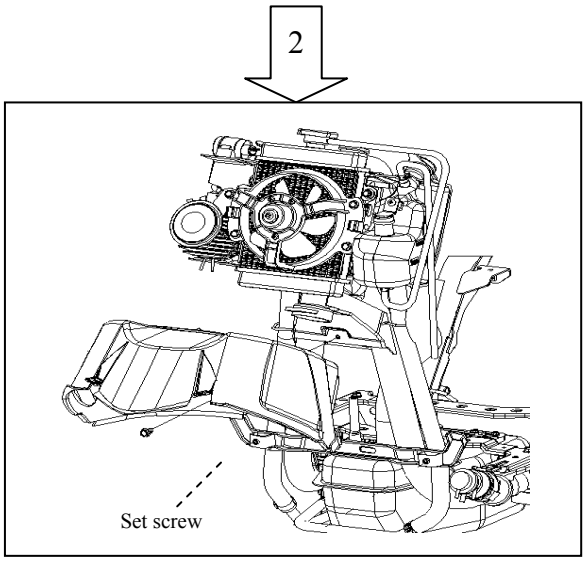


◙ Remove the set screw / nut on the handlebar.



◙ 1. Remove the self-lock nut and the upper ring-shaped nut.

2. Remove the cage ball bearings (upper & lower) and the front fork.



◙ Remove 1 set screw on the front inner panel.

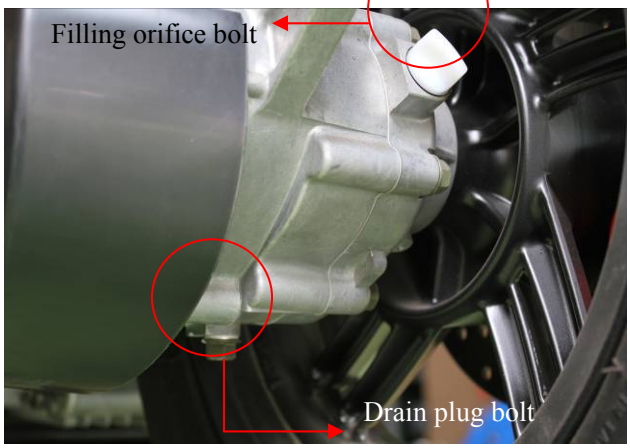
1) Gear oil

Volume

Total oil volume: 110c.c.

Oil volume replaced: 90c.c.

Service cycle: Every 3000km



Check the oil level

◆ Park the motorcycle on a horizontal surface for check.

1. Place a graduated cup under the drain plug bolt prior to removal of the bolt.
2. Check the oil volume after the gear oil is evacuated.

Oil replaced

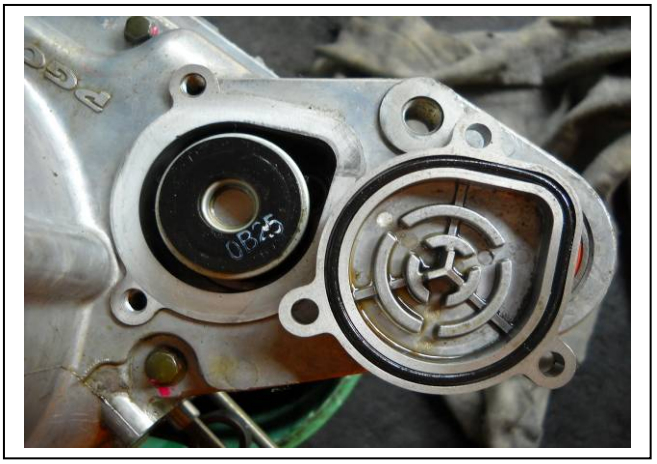
1. Place a vessel under the drain plug bolt; remove and clean the bolt.
2. Install the bolt with the gear oil evacuated.
3. Open the filling orifice and pour new gear oil; tighten a filling orifice bolt.
   Torque: 1.2~1.8(kg-m)

△Note: To avoid oil leakage, please check the aluminum gasket attached to the drain plug bolt and the O-ring attached to the filling orifice bolt for any deformation.

2) Engine oil filter

Function: Filter any impurities or iron filings in engine oil to avoid the engine worn.

Service cycle: Every 6000 km.



- It is recommended that the O-ring shall be replaced with the gear oil filter changed.

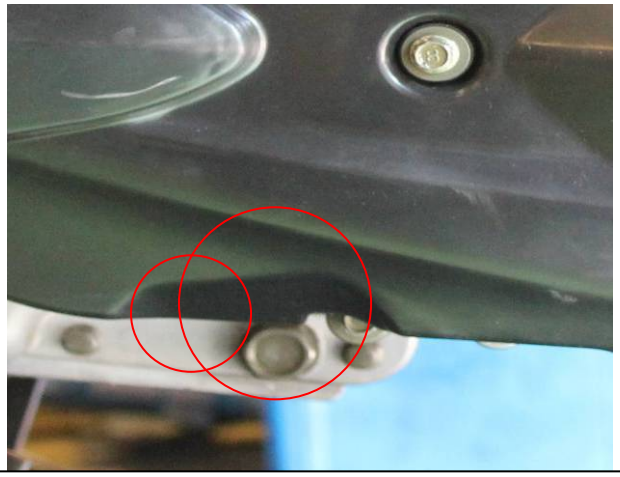
3) Engine oil

Volume

Total oil volume: 1000c.c.

Oil volume replaced: 800c.c.

Service cycle: 1000km



Check the oil level

- ◆ Park the motorcycle on a horizontal surface for check.
- ◆ Start the engine for 3-minute running and stop it for another 3-minute; make a measurement.

1. Remove the oil meter counterclockwise and clean it.
2. Screw the oil meter into the filling orifice to measure the oil level.
3. The oil level should be higher than the lower limit but lower than the upper limit. Add any engine oil for oil insufficient.

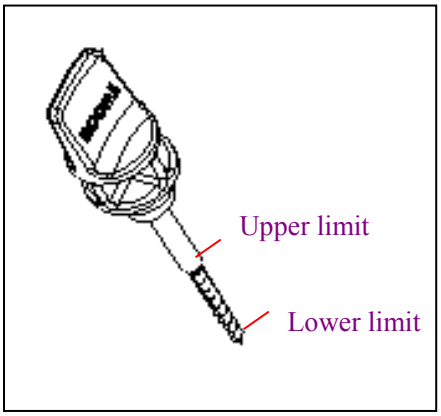
△Note: Some disadvantages such as engine damage and performance deterioration may be attributed to engine oil out of the range.

Oil replaced

1. Remove and clean the drain plug bolt; check the gasket for any defect and replace the defective gasket with a new one. Screw the bolt with the engine oil evacuated.
2. Remove and clean the oil meter. Add new engine oil to 800c.c. (volume replaced) and screw the oil meter.
3. Start the engine and check any engine oil leaked; remove the oil meter and check the oil level again.

   Torque: 2.5~3.5(kg-m)

△ Note: Engine oil to be replaced shall be 1000c.c. for the engine disassembled and installed.



3) Air filter

Recommended service cycle:

Check: Every 1000 km

Change: Every 6000 km or less than 6000 km in the event of filth.

Check / Change

1. Remove 8 set screws on the air filter cover.
2. Check packing for filth or damage; clean packing with high-pressure air gun.
3. Replace the air filter with a new one in the event of the old one too filthy.

△Note: Do not rinse packing with water or organic solvent.

5) Auxiliary water tank

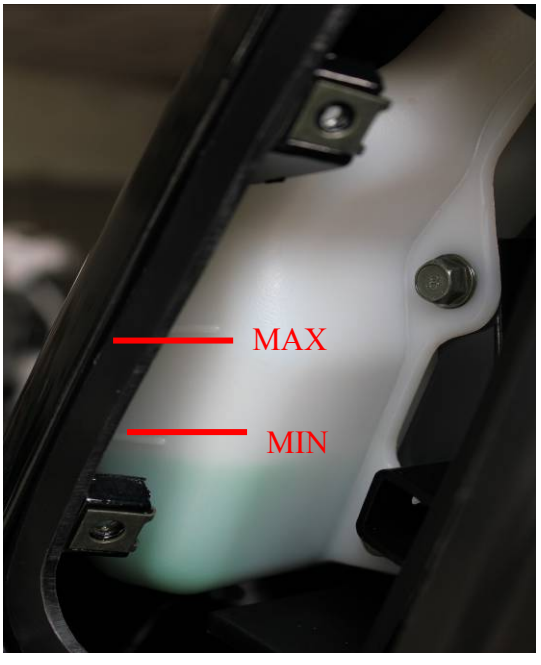
Recommended service cycle:

Check: Every 1000km

Check the water level

Remove 1 set screw on the filler cover and check the water level higher than the lower limit. Add any water to keep it up to the upper level.

△ Note: Do not add coolant over the upper limit to avoid water temperature too high and the water pressure too high (greater than 1.1bar) which causes coolant in the water tank injected into the auxiliary water tank and coolant overflowing.



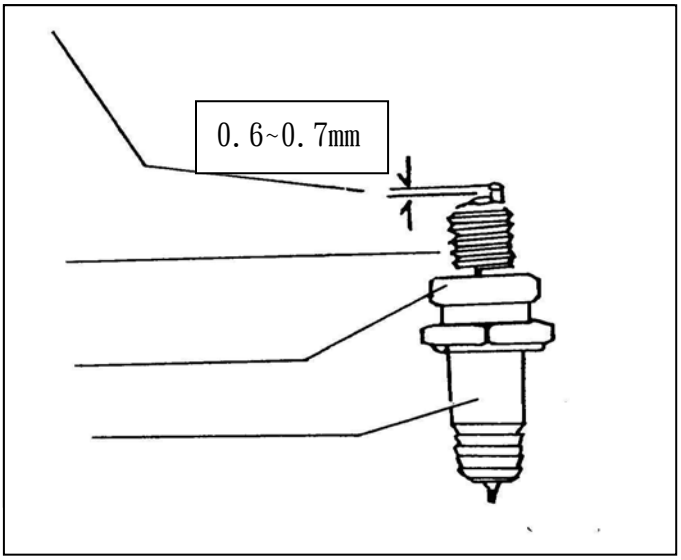
6) Spark plug

Check

1. Use a spark plug socket to remove the spark plug.
2. Check the spark plug for damage, filth, or carbon deposition.
3. Use carbon remover or a steel brush to clean any filth or deposited carbon.

Specific model: CR7E NGK or similar substitute

Spark plug gap: 0.6~0.7mm

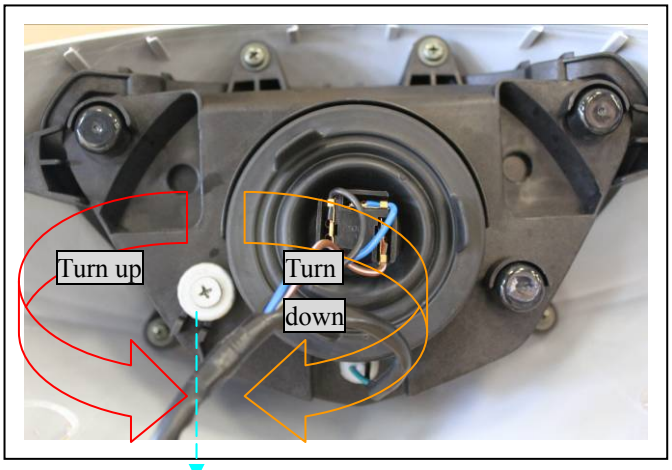


7) Front lamp

Adjustment:

Keep the front handlebar cover assembled; insert a Phillips screwdriver into a prepared hole in the lower left corner of the front handlebar cover and turn a screw to adjust the angle of projection. The beam to be projected could be changed by moving the reflecting plane's angle upward or downward.

Lamp spec.: **H4 12V 50W/55W**



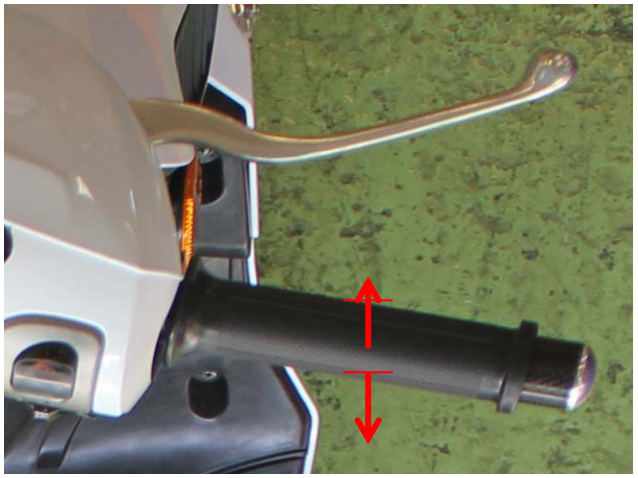
Adjusting screw to change angles of beam projected

8) Back-play of throttle cable

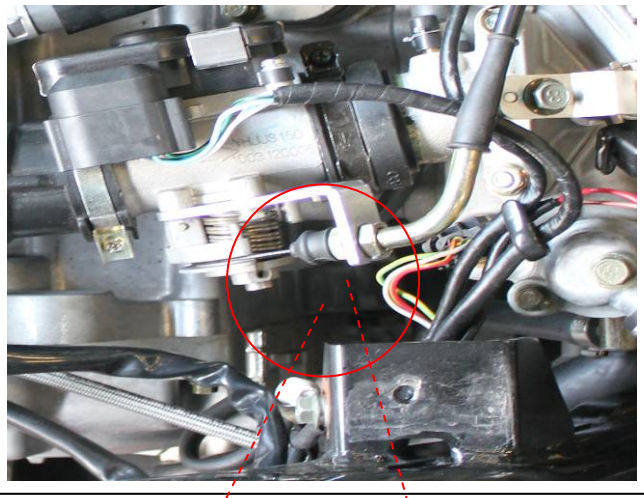
Check

Turn the right grip and check movement of the throttle. If unsmooth, check the throttle cable, throttle, throttle spring or replace any of them.

Back-play: 2-6mm

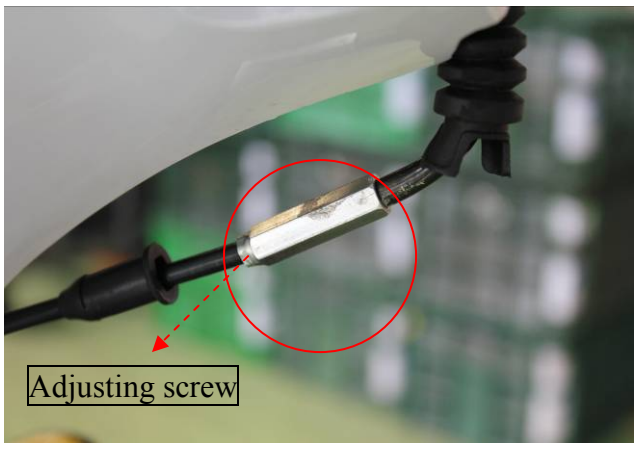


⊙ Adjustment of the back-play should be completed at the throttle by loosing the nut attached to the set screw for back-play properly adjusted.



Adjusting screw Set screw

⊙ Fine-tuning of the throttle cable: Remove the sheath and loose the set screw; turn the adjusting screw until the proper back-play is reached.

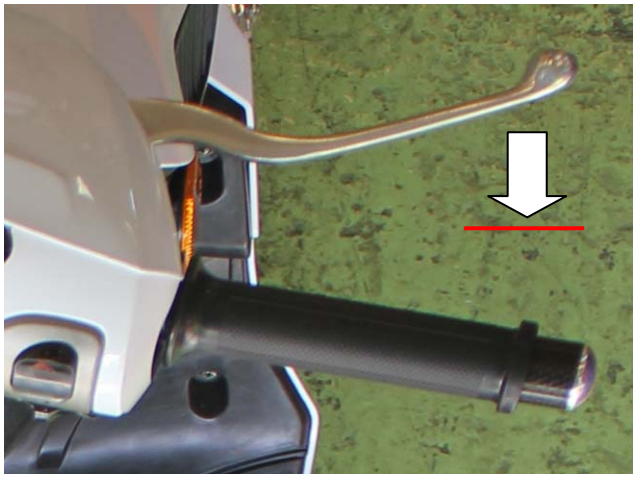


9) Brake system

Brake lever

Check the back-play by pressing the brake lever for any inconformity.

Back-play: 10-20mm



Brake disk

Check the brake disk for any surface uneven.

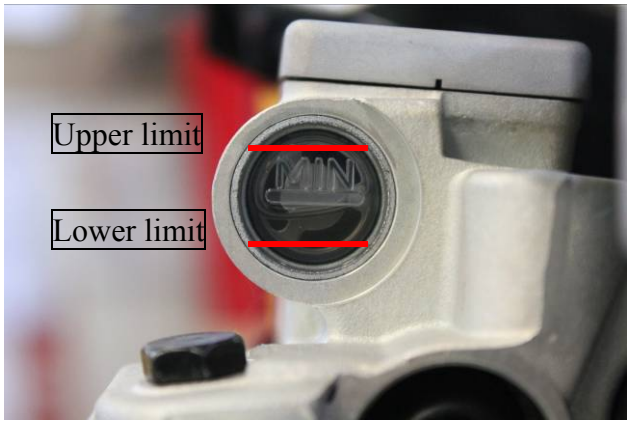
Check the brake disk's runout within the spec.

Rated value: ±0.1mm

Runout limit: ±0.3mm

Brake oil

Check if the oil level is less than the lower limit. If any, please add brake oil to the upper limit.

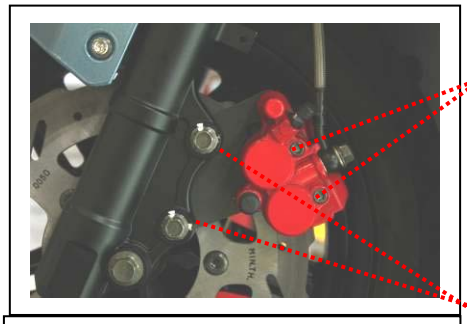


⊙ **Check the thicknesses of any brake lining prior to adding any brake oil. In the event of brake oil added without any brake lining checked first, the brake oil will overflow from the pump assembly during replacement of a brake lining.**

Change of a front brake pad

Tool to change a brake pad:

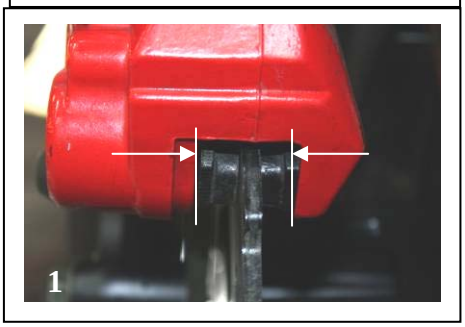
1. Allen wrench
2. 12” T-type wrench



Check a brake pad’s thickness:

Lowest acceptable thickness of a front brake pad

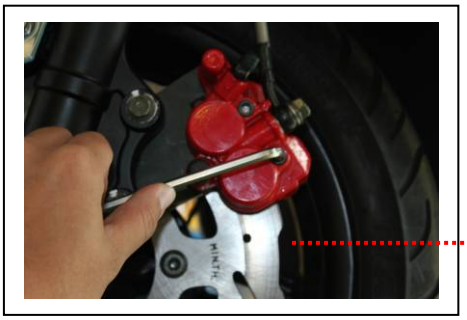
>4.0mm (with the base’s thickness)



Change a brake lining:

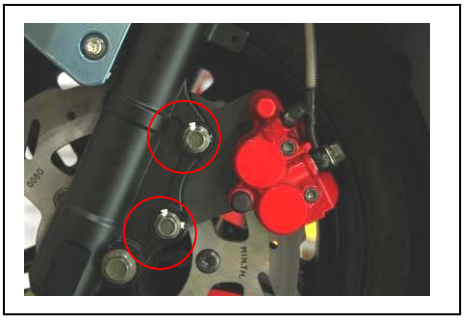
1.

Use an Allen wrench to loose two pins fixing a brake shoe.



2.

Use a 12” T-type wrench to remove two set screws and then the brake calipers.



3.

Use a slotted screwdriver to push back the piston with the brake calipers removed.

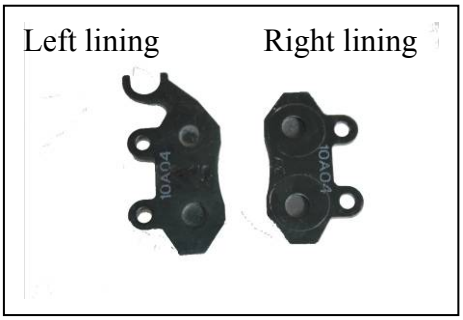
4.

Take out the brake shoe with pins removed.

5.

Check if the thickness of each of two brake linings is within the limit again with the brake shoe removed.

Lowest limit of a brake lining >4.0mm

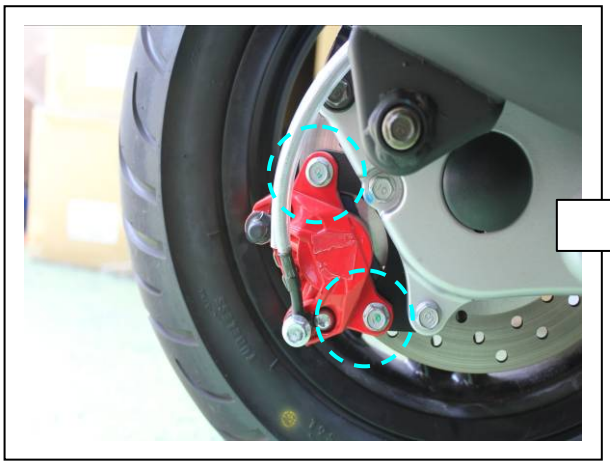


6.

Install all parts in a reverse order.

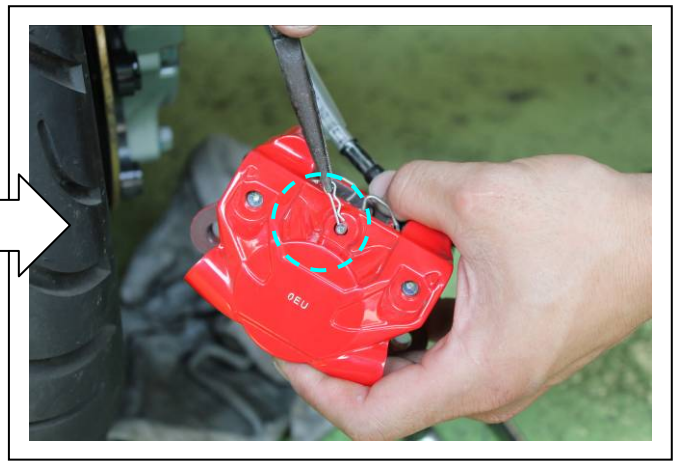
Change the rear brake pad

Brake pad



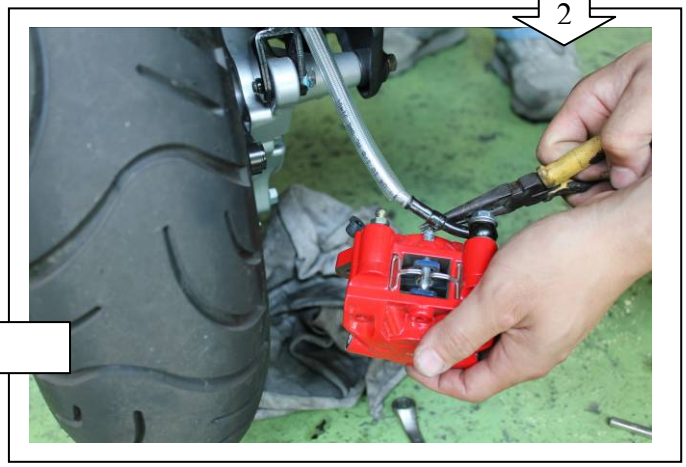
⊙ Remove set screws fixing the rear brake shoe.

1



⊙ Use the long nose pliers to remove the R-type snap ring.

2



⊙ Use the long nose pliers to remove the dowel pin.

3

⊙ Remove the brake pad.

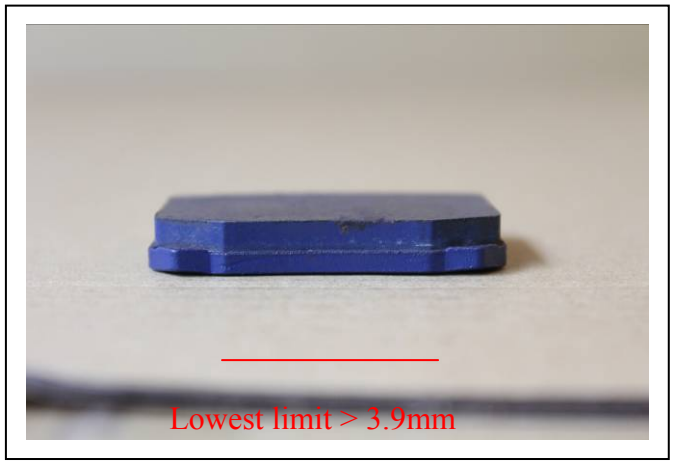
Install all parts in a reverse order.

Check the rear brake pad

Check the brake pad for any excessive wear or break.

Lowest acceptable thickness of a rear brake pad

>3.9mm



Change brake oil

Steps:

1. Loose the drain plug bolt.
2. Use an oil pump to draw used oil.
3. Add new oil.
4. Use an oil pump to evacuate air in the oil hose; keep the oil cup not empty during evacuation.
5. Tighten the drain plug bolt.
6. Check back-play of the brake. If unconformable, repeat the previous steps to evacuate air.

10) Valve clearance

Check valve clearance.

Tool: Thickness gauge; wrench for adjustment of valve

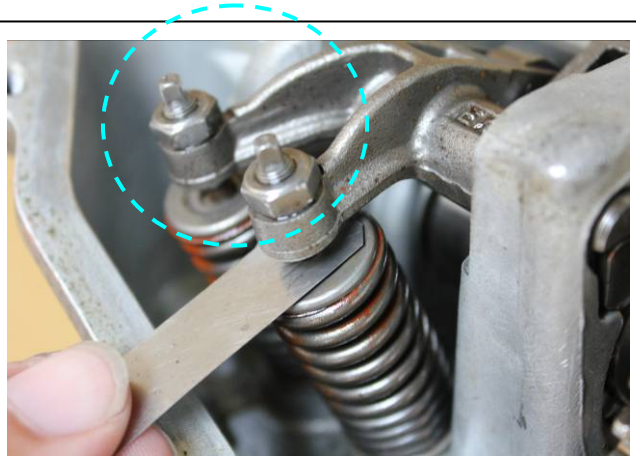
Method: Adjust the piston to the upper dead center (Flywheel "T" mark=Timing); use the thickness gauge to check the valve clearance within the spec.

Adjustment: Loose the set screw and turn the adjusting screw within the spec. in the event of the valve clearance incorrect.

Valve clearance:

IN: 0.10mm

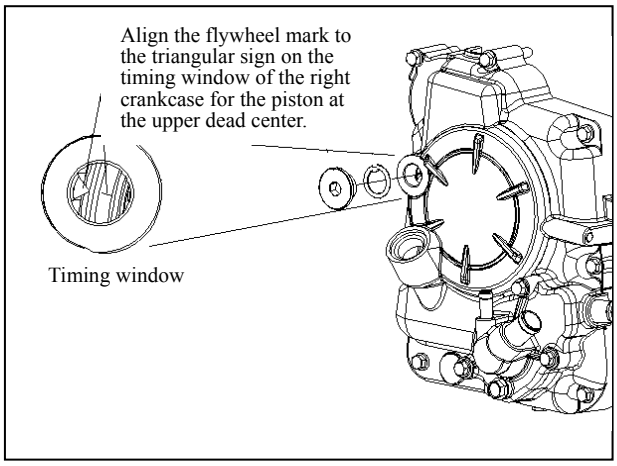
EX: 0.10mm



△Note: Check and adjust the valve clearance when the motorcycle is not started or the engine temperature is low.

△Note: Torque to adjust the nut for the valve clearance, T=0.7kg-m.

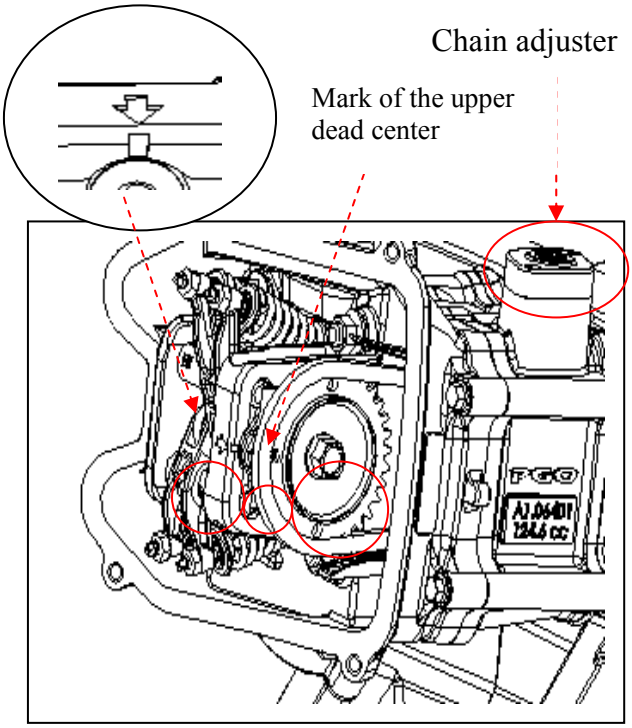
11) Check / adjust timing


Align the flywheel mark to the triangular sign on the timing window of the right crankcase for the piston at the upper dead center.
Timing window

Check:

1. Align the flywheel “T” mark to a triangular sign on the timing window of the right crankcase.

△Note: Torque, T=0.9~1.1kg-m



2. Check if the mark for the upper dead center of the camshaft sprocket is aligned to the mark “→” on the cylinder head.

Adjust

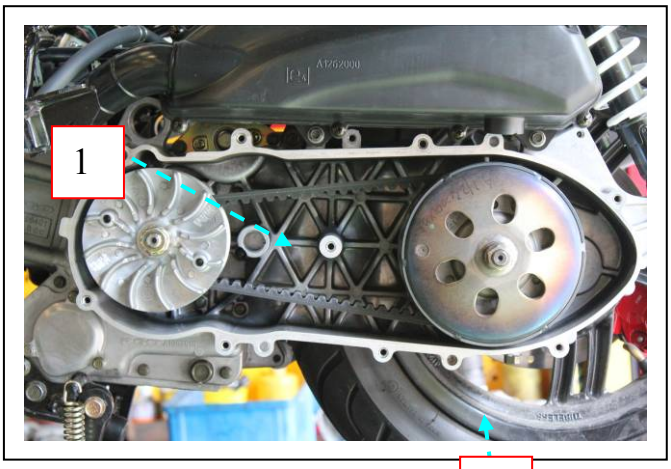
1. Tighten the adjusting screw of the chain adjuster to loose the chain. Remove the set screw on the camshaft sprocket; align the mark of the upper dead center on the camshaft sprocket to “→”. Install all parts in a reverse order.

Set screws on the camshaft sprocket

12) Driving belt / clutch lining

1. Check the driving belt for any chaps or wear; replace it if necessary.

2. Gradually increase RPM and check articulation of the clutch lining. Please check the clutch lining or replace it, if necessary, for any situation such as vehicle starting unsmooth, no movement, stall, etc.



13) Tire & wheel

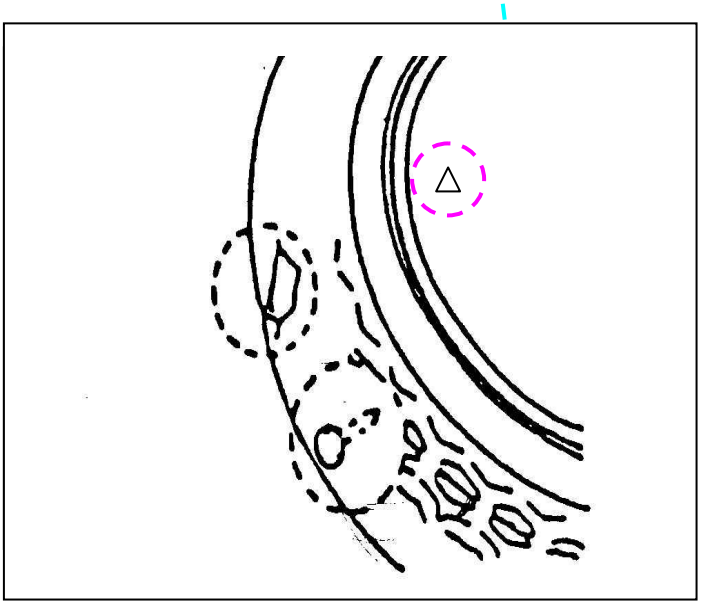
Check the tread / wall for any wear, break, or nail.

▽: Tread wear indicator

Check tire pressure:

	Front Wheel	Rear Wheel
1 Person	2.0kg/cm^2	2.0kg/cm^2
2 Persons	2.0kg/cm^2	2.25kg/cm^2

△ Note: Check the tire pressure at low temperature.



Tire model:

Front: 110/70-12 4PR

Rear: 130/70-12 4PR

14) Suspension system

Front shock absorber

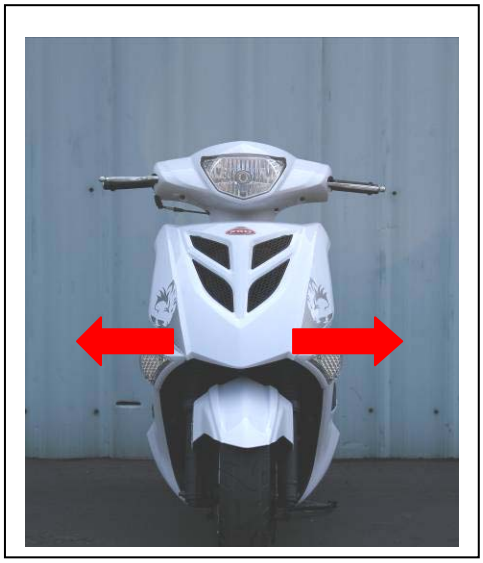
Use the center stand to support the motorcycle; firmly grip the front brake lever and press front shock absorbers several times to check any noise, leakage, screw loosened, or bushing worn.

Rear shock absorber

Use the center stand to support the motorcycle; press rear shock absorbers several times to check any noise, leakage, screw loosened, or bushing worn.

15) Steering lever system

Use the center stand to support the motorcycle and make the front wheel leave the ground; turn the steering lever to check any non-smoothness. In the event of tension incorrect, adjust the steering arm nut and control the triple trees in place.

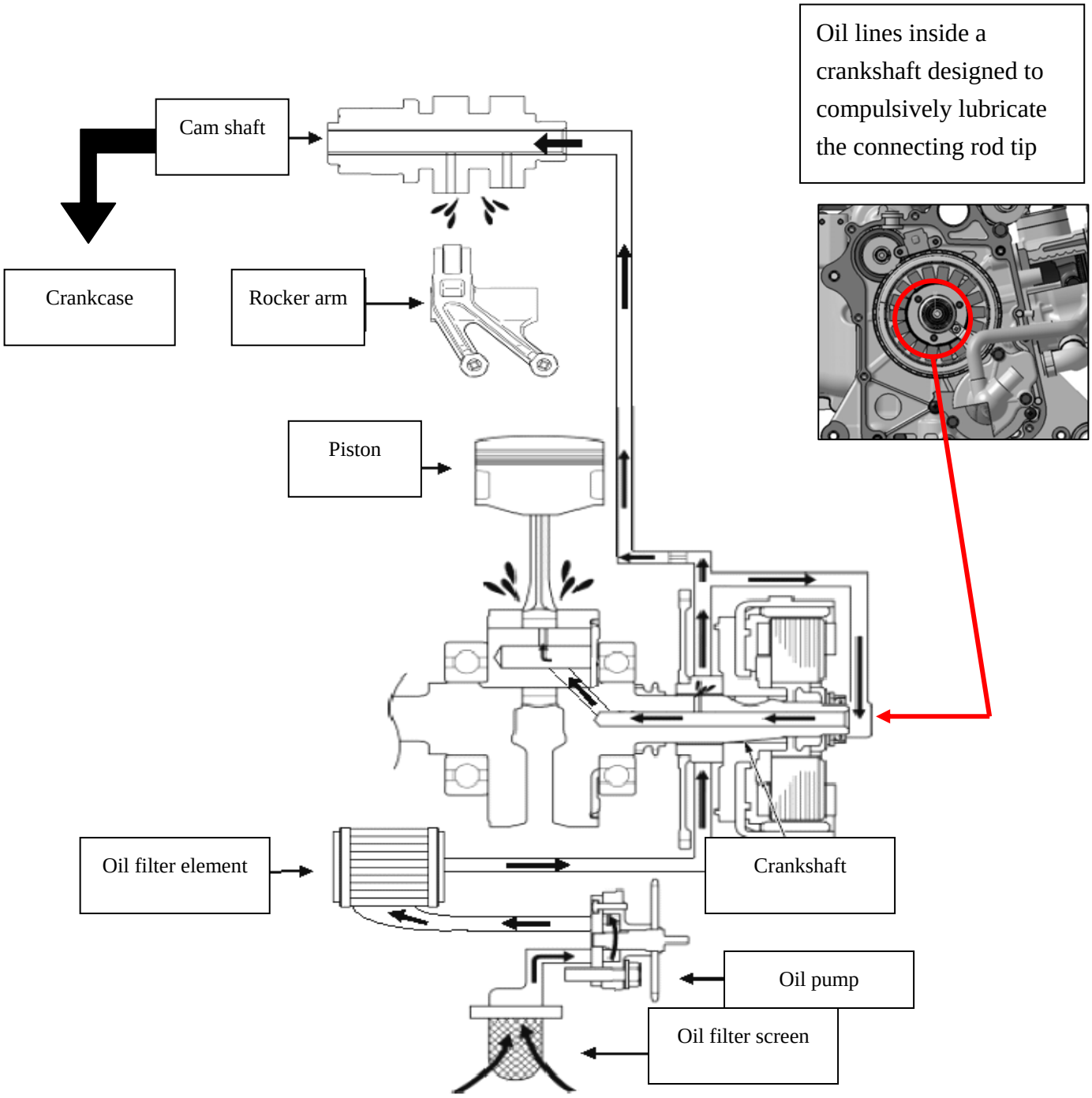


16) Items and cycle for periodical maintenance

Item	Content	First 300km or 1 month	Every ____ km or _____ months					
			3,000/ 3 Months	6,000/ 6 Months	9,000/ 9 Months	12,000/ 12 Months	15,000/ 15 Months	18,000/ 18 Months
Engine oil*	Change (Refer to Note 1 on the previous page.)	○	Every 1,000 km					
Secondary engine oil filter	Change	○	Every 5,000 km					
Engine oil filter element*	Clean or change, if necessary.	○	Every 2000~3,000 km					
Air filter, belt den	Change or clean		○	○	○	○	○	○
Gear oil*	Change	○	○	○	○	○	○	○
Front & rear (disk) brake	Wear and movement of brake linings; leakage of brake oil. Repair brakes, if necessary.		○	○	○	○	○	○
Engine coolant*	Change	Every two years*						
Cooling system	Check the water tank and hoses for any leakage or aging or change them, if necessary. (Refer to note 3.)	Every 5000 km						
Coolant level (auxiliary water tank)	Check the level of coolant in the auxiliary water tank and hoses for the cooling system for any leakage. (Refer to note 3.)	Check the coolant level every 2000 km and add new coolant to the standard level.						
V belt*	Check any damage or wear. Clean the V belt prior to any grease applied, or change it, if necessary.			○		R		○
Clutch	Check the movement or clean the clutch, if necessary.		○	○	○	○	○	○
Pivot, brake arm* (drum)	Check the movement or adjust the pivot, if necessary.			○		○		○
Tire*	Check balance, damage, and roundness, or change any tire, if necessary.		○	○		○	○	○
Bearing, tire*	Check the bearing assembly for any looseness.		○	○	○	○	○	○
Front fork & rear shock absorber*	Check the movement and any leakage.	○	○	○	○	○	○	○
Bearing, steering lever *	Check tightness or adjust it, if necessary.			○		○		○
Main (side) stand*	Check functions or change it, if necessary.	○	○	○	○	○	○	○
Tightness *	Check tightness of parts in the motorcycle or adjust it, if necessary.	○	○	○	○	○	○	○
Battery*	Check voltages of the MF battery greater than 12.8V; charge the battery, if necessary. Clean terminals.		○	○	○	○	○	○

- "○": Required item
- "*": PGO distributor only
- Maintenance cycle: Complete check every 6,000 km and minor maintenance every 3,000 km; follow the same frequency hereinabove for any motorcycle's mileage greater than the number in the table.

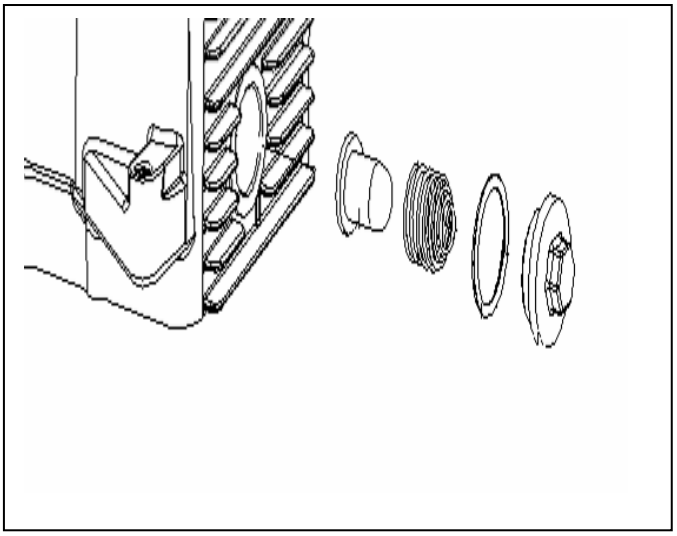
Lubrication system diagram



1) Cleaning of filter screen

A. Remove the oil filter screen cover
B. Remove the oil filter screen and the spring.
C. Clean the oil filter screen.
D. Make sure of the O-ring and the oil filter screen, or replace any of broken part, if any.

Note: Clean the oil filter screen with the engine disassembled to avoid the oil hose blocked by any impurity and the engine damaged.



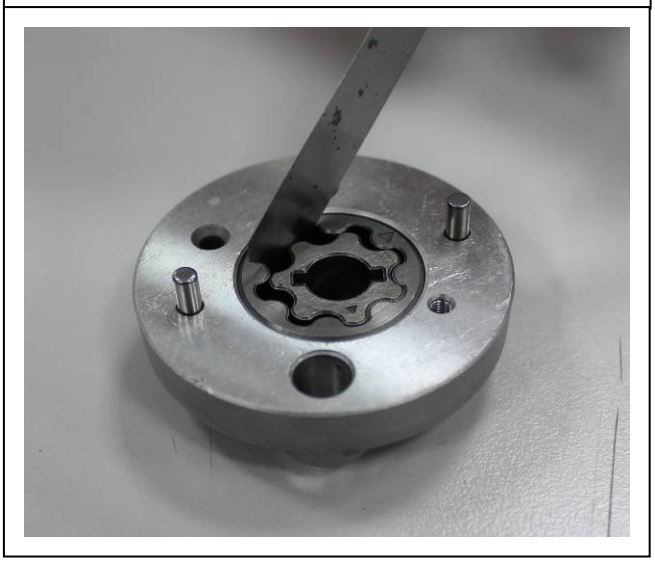
Oil pump

Removal: Refer to disassembly of the engine.

Check:

Clearance of inner and outer rotators in the oil pump

Limit accepted: <0.15mm

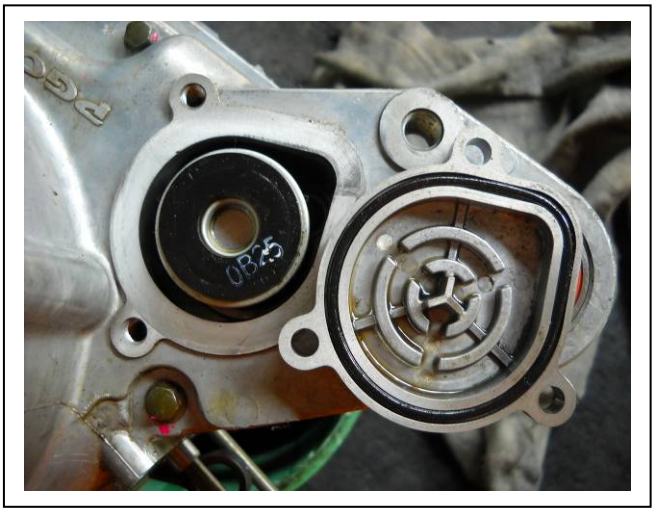


3) Oil filter

Change

A. Remove 3 set screws on the oil filter cover and take out the cover.

B. Take out the oil filter element and replace it with a new one.



Mileage for replacement of an oil filter element: 5000 km

Note: Check and replace the O-ring for proper installment simultaneously.

1) Separate the engine from the vehicle body

Procedure:

1. **Remove the luggage compartment**

2. Disconnect the engine wiring harness; remove the spark plug cap

- Disconnect the sensor cable

Remove parts as follows: nozzle, engine temperature sensor, throttle valve sensor, idle controller, and oxygen sensor.

Disconnect cables for the generator and the crank angle sensor.

Disconnect the engine ground cable on the right crankcase.

Disconnect the power line linked to the start motor.

3. Disassemble the exhauster

Please keep watch for no Lambda sensor collided and damaged during removal of the exhauster.

4. Disassemble the engine's throttle cable and vacuum tube

Disassemble the throttle cable.

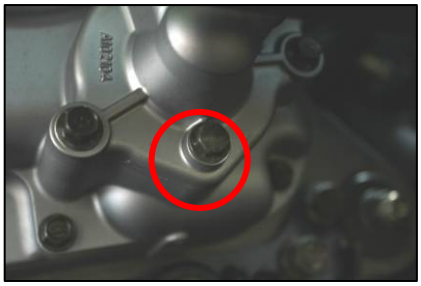
Disconnect all vacuum hoses connected the engine manifolds and the air filter.

5. Disconnect high-pressure fuel hose connector

Use a tool to remove the clamp.

Disconnect the high-pressure fuel hose. **Note: Release the pressure first prior to disconnection of the high-pressure fuel hose.**

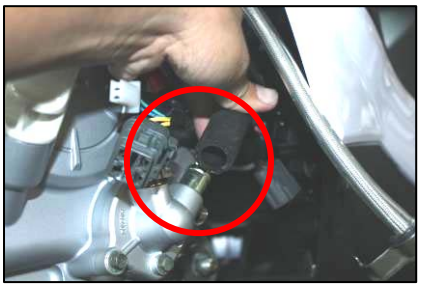
6. Drain cooling water



Drain cooling water by removing the drain plug bolt.

7. Disconnect the cooling tube

Disconnect the upper cooling tube.



Disconnect the lower cooling tube.

8. Remove calipers and fuel hose clips

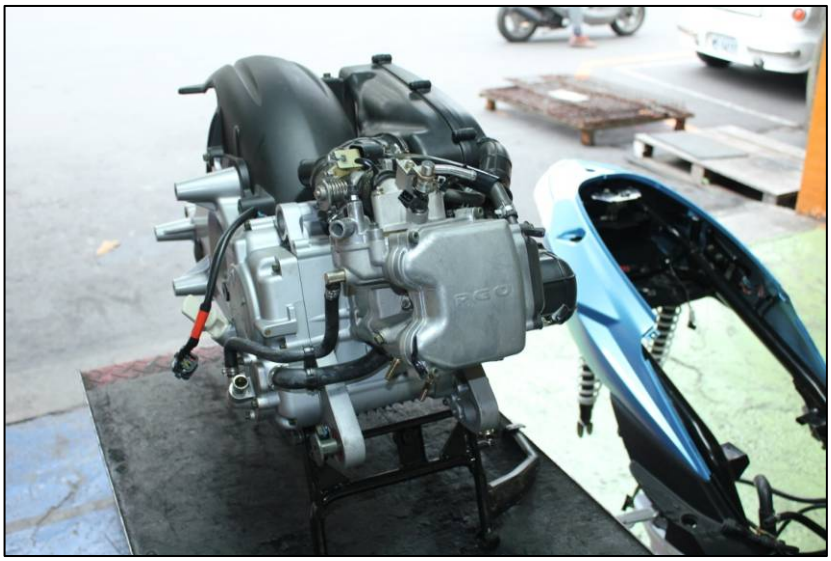
Remove the calipers.

Disconnect fuel hose clips to remove the calipers and the fuel hose.

9. Remove set bolts for shock absorbers

10. Remove bolts for the engine hanger

11. Separate the engine from the vehicle body



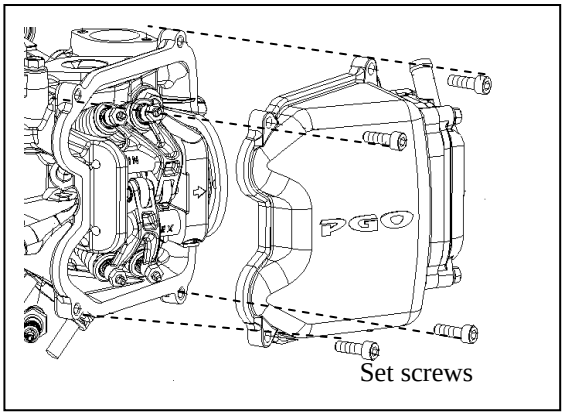
Remove the vehicle body with the engine separated from the vehicle body; disassemble the engine.

Removal and disassembly

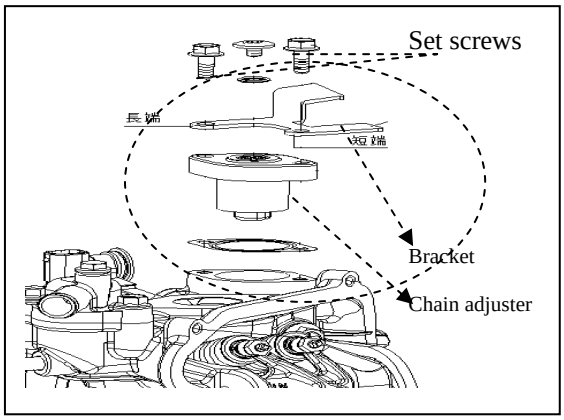
1. Remove the cylinder head

Procedure:

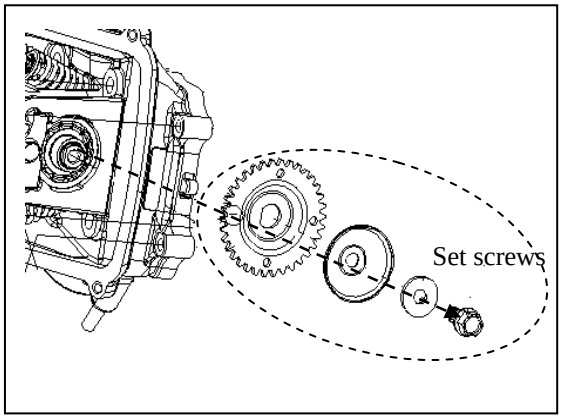
A. Remove 4 set screws on the cylinder head to take out the cylinder head cap.



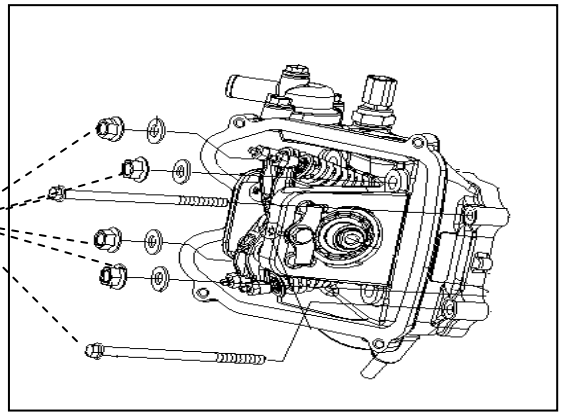
B. Remove 2 set screws of the chain adjuster and take out brackets and pads supporting the idle controller of the chain adjuster.



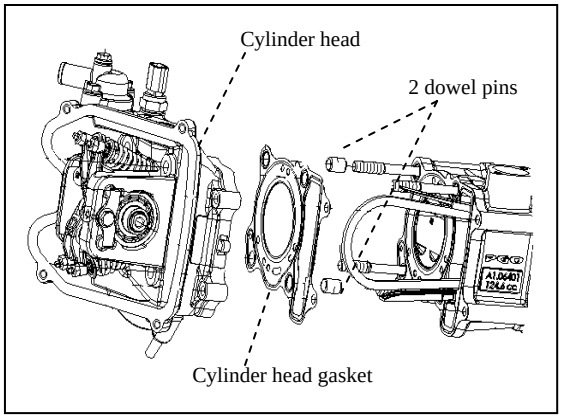
C. Remove 1 set screw of the camshaft sprocket and take out the camshaft sprocket and the turning disk.



D. Disconnect the water outlet of the temperature controller (water tank and water pump). Remove 6 units of set screws, nuts and washers on the cylinder head.



E. Remove the cylinder head, cylinder head gaskets and 2 dowel pins.

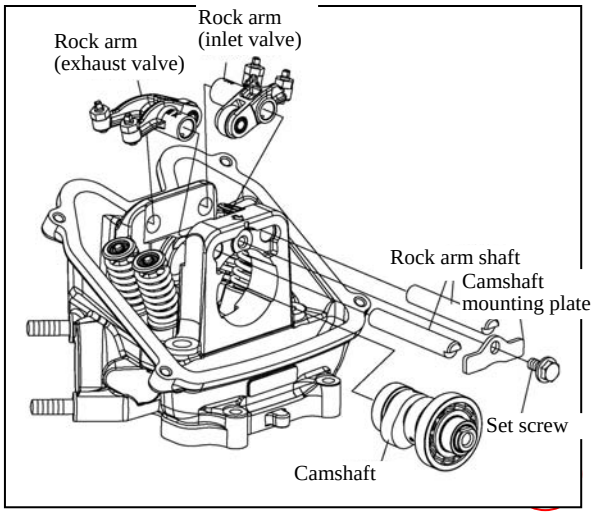


2. Disassemble the cylinder head

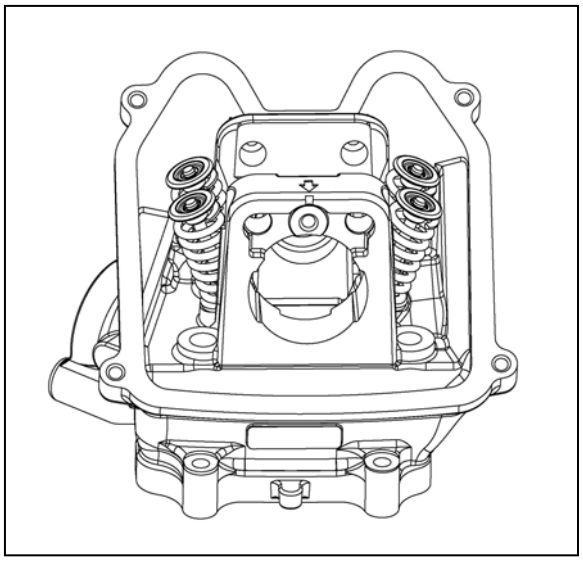
A. Use a wrench to remove set screws on the camshaft mounting plate.

B. Remove the camshaft mounting plate, the rock arm shafts (intake & exhaust valves) and the rock arms (intake & exhaust valves).

C. Remove the camshaft.

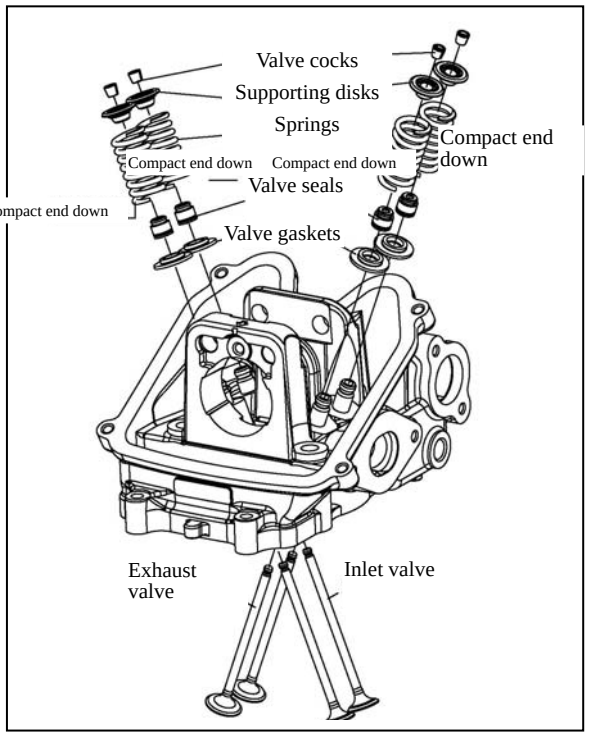


D. Remove the camshaft and the rock arm to remain the main body and the intake & exhaust valves.



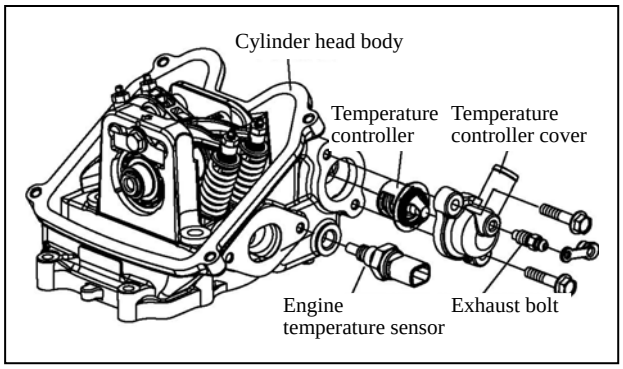
E. Disassemble the intake & exhaust valves:

1. Use tools to remove valve cocks.
2. Remove parts such as supporting disks, springs, and valve gaskets.
3. Remove the intake & exhaust valves.
4. Remove valve seals (which must be replaced for disassembly of the intake & exhaust valves).



F. Loose bolts on the temperature controller; remove the temperature controller cover and take out the temperature controller.

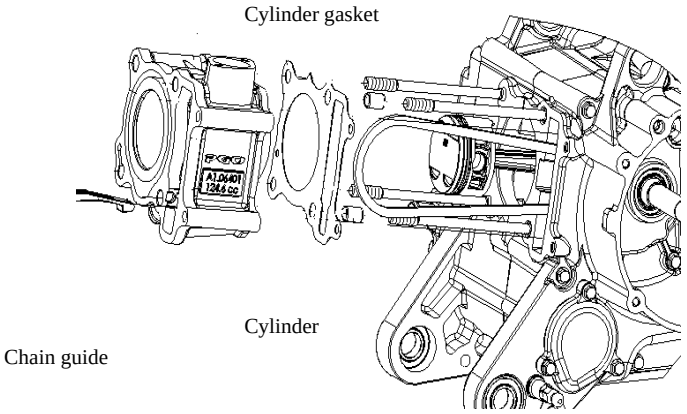
G. Remove the engine temperature sensor.



Disassemble the cylinder

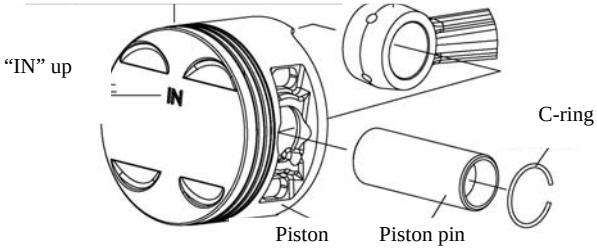
Remove the cylinder head for the steps as follows:

A. Sequentially take out parts such as chain guide, cylinder, cylinder gasket, and dowel pins.



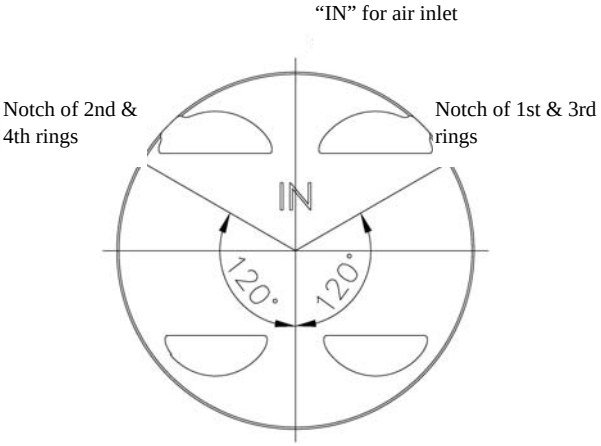
B. Use the long nose pliers to take out parts such as C-ring, piston pin, and piston.

Check the angle to install an oil scraper ring of the piston ring and keep an angle of 120 degrees without the oil scraper ring aligned with the piston pin prior to assembly of a cylinder.



C. Notice notches during installation of the piston ring.

1. Notches of the first & third rings must avoid the spark plug and the shock surface. Direction: Upper left cylinder column.
2. Notches of the second & fourth rings must avoid the shock surface; an included angle is developed between the first & third rings and the second & fourth rings. Direction: Upper right cylinder column.

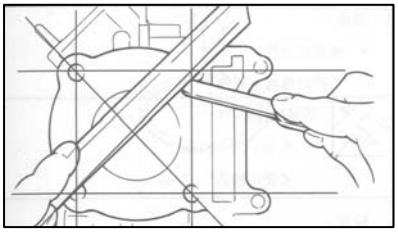


⚠ Shock surface: Piston exhaust

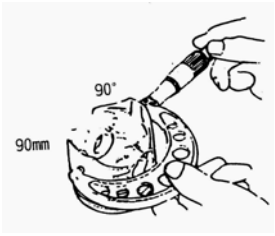
Shock surface

Measurement and check

1. Visually check the external of the piston or replace it with a new one in the event of the old one useless.
2. Check the inner diameter of the piston pin (standard size: **15mm**; size limit: **15.040mm**) or replace the old one in the event of the bore out of the size limit.
3. Check the outer diameter of the piston pin (standard size: **15mm**; size limit: **14.960mm**) or replace the old one in the event of the bore out of the size limit.
4. Measure the piston's outer diameter at 7mm below the skirt and 90° from the piston pin (standard size: **52.4mm**; size limit: **52.3mm**).
5. Check the level of the cylinder surface.
   Limit—**0.05mm**; correct or replace the cylinder.



7mm



Standards of clearances for various piston rings

Item	Piston ring	Standard size	Limit
Clearance between the piston ring groove and the piston ring	Fist	0.015mm~0.050mm	0.090mm
	Second	0.015mm~0.050mm	0.090mm
Clearance of the piston ring gap	First	0.10mm~0.25mm	0.50mm
	Second	0.25mm~0.45mm	0.65mm

Install the cylinder and the piston

1. Installation of the piston

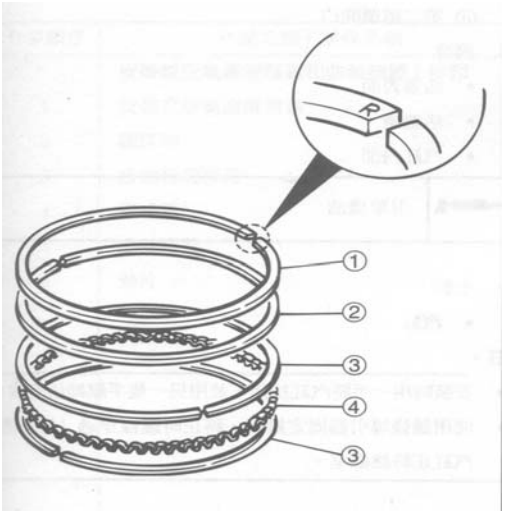
A. Sequentially install piston rings on the piston

B. Apply engine oil around piston rings.

Note: Do not scratch or break any piston ring.

"R" marks should face up during assembly.

The angle between the first ring's gap and the second ring's gap should be not less than 120 degrees; gaps should not be placed at the piston pin.

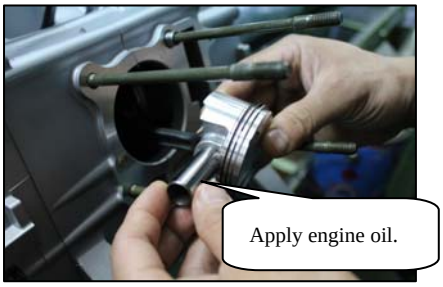


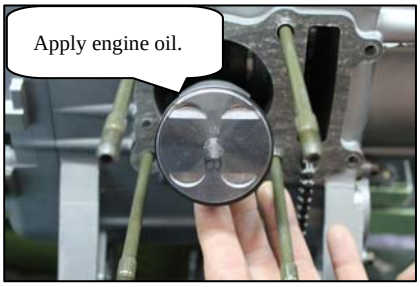
C. Install parts such as piston, piston pin and grip ring for piston pin.

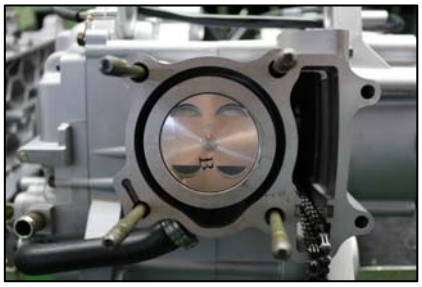
Note: The arrow mark on the piston' top should face the exhaust valve during assembly. To avoid any grip ring dropped into the crankcase, please take a piece of clean cloth to plug the crankcase.

2. Installation of the cylinder

1. **Install dowel pins and cylinder gaskets on the crankcase.**
2. **Install the piston and apply engine oil at the contacting surface between any piston pin and the connecting rod.**
3. **Apply engine oil on the cylinder's inner surface, the piston, and the piston rings during assembly of the cylinder. Cautiously install the piston along with piston rings into the cylinder.**



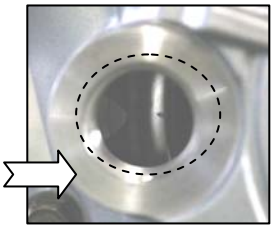


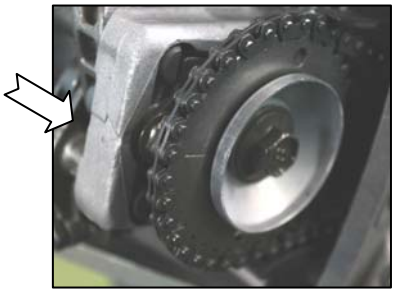


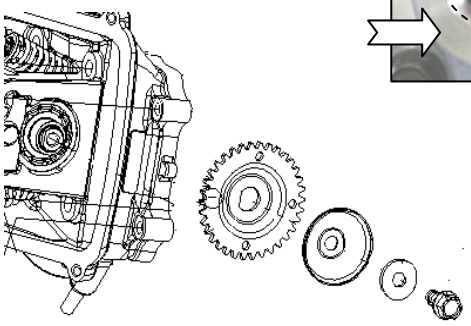
3. Installation of the cylinder head

1. Install the chain tensioner.
2. Install the dowel pin.
3. Install the cylinder head gasket.
   *** Replace the cylinder gasket during disassembly of the cylinder head.**
4. Install the cylinder head.
5. Screw the set nuts on the cylinder head diagonally.

6. Align the mark in the timing hole of the right crankcase for installation of the timing sprocket with nuts fixed on the cylinder head.

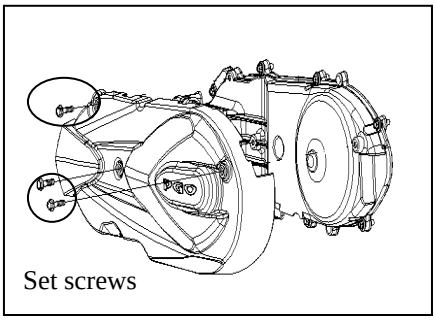




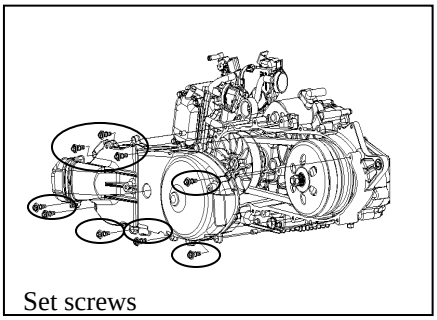


Left cover / drive belt assembly

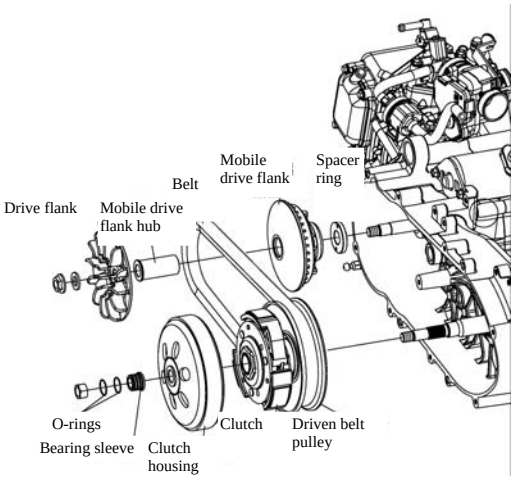
A. Remove 3 set screws on the left cover cap and take out it.



B. Remove 9 set screws on the left cover and take out it.

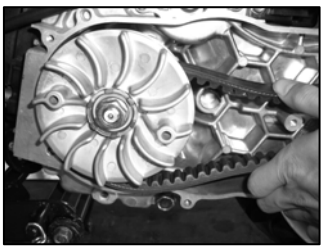


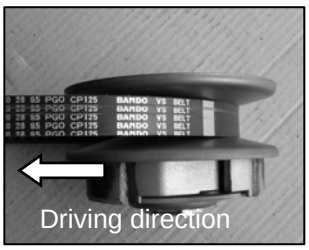
C. Remove 1 set nut on the front drive unit and take out parts such as drive flank, mobile drive flank, mobile drive flank hub, and sleeve. Remove 1 set nut on the rear drive unit and take out parts such as bearing sleeve, clutch housing, driven belt pulley, and belt.



Installation

1. Install the said parts in a reverse order.
2. Cautiously handle the belt during assembly.
   A. Characters on the belt should point the driving direction.
   B. To avoid a drive flank wrongly locked, the driven belt pulley should be inserted first and allows the belt to be loosened during the drive flank attached.

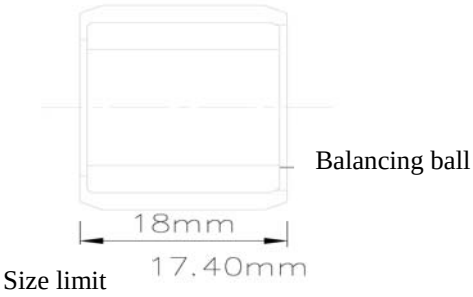




Limit sizes of parts

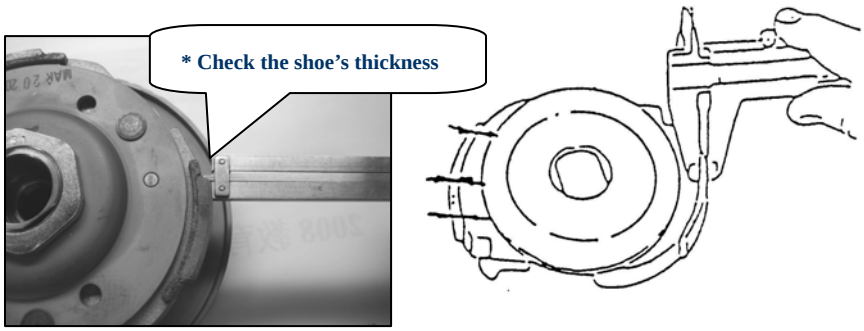
A. **Balancing ball**: Standard outer diameter=18.0mm; limit size>17.40mm.
Replace any part with the measured size unconformable to spec.

Size: 18.0mm
Weight: 11g



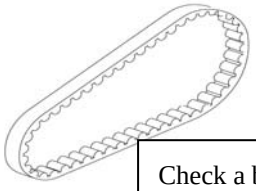
B. **Inner diameter of the mobile drive flank hub**: Standard size=24.0mm; limit size=24.06mm.
Replace any part with the measured size unconformable to spec.
Flank check: Replace any flank with the level not good (any groove developed) which makes the speed change unsmooth.
Ball groove: Check roughness of the ball grooves which affect smoothness of speed change and the balls' service life, or change any defective balls.

C. **Measurement of a used clutch shoe**
Standard size: 4mm
Lowest limit: 2mm



D. **Measurement and check of a belt**
Check a removed belt's external for any chaps.
Standard width: 20.12mm
Lowest limit: 19.00mm

Size limit

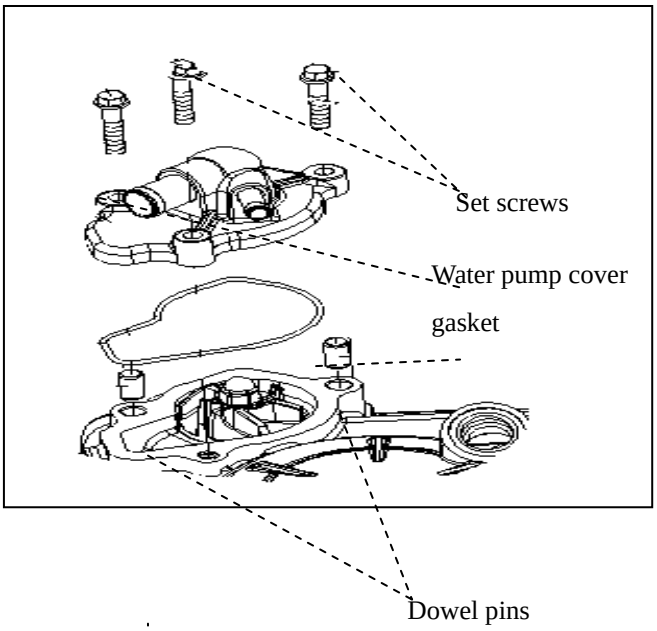


Check a belt's external

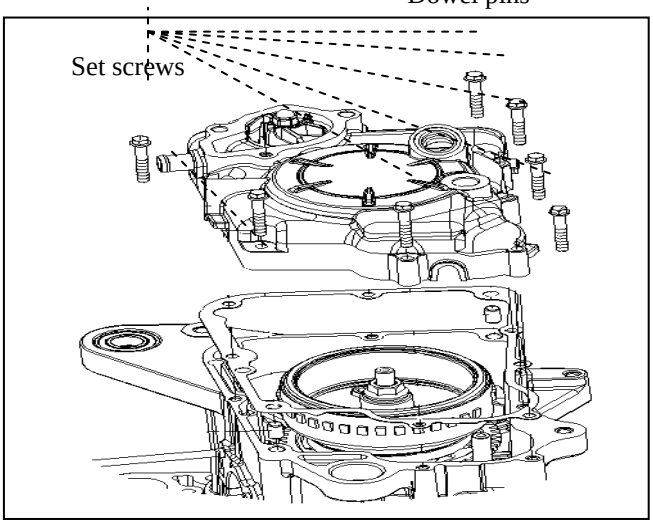
E. **Measurement of the mobile drive flank hub**
Standard size: 24.00mm
Limit size: 23.94

■ Right crankcase cover

A. Remove 3 set screws on the water pump cover and take out parts such as water pump cover, gasket, and dowel pin.
Torque=0.9~1.1kg-m



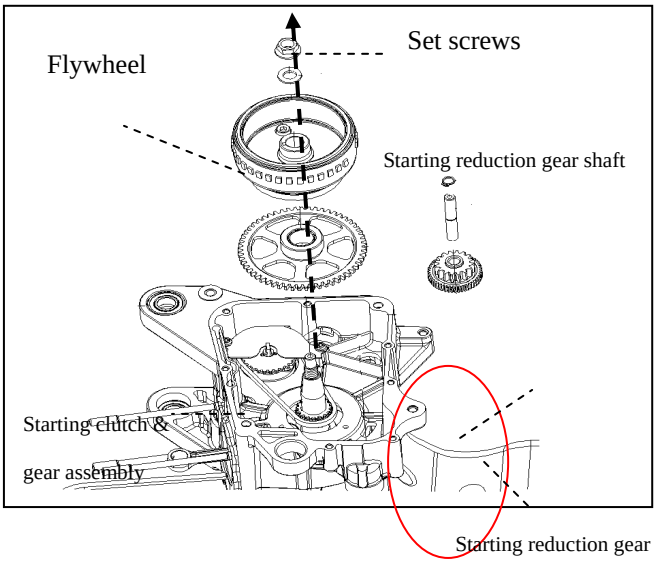
B. Remove 7 set screws on the right crankcase cover and take out the right crankcase cover, gaskets and dowel pins.



■ Magnetic motor assembly and starting clutch assembly

A. Remove the starting reduction gear and the starting reduction gear shaft.

B. Remove 1 set nut of the flywheel and the starting clutch; take out the flywheel and the starting clutch with a flywheel puller.



■ Disassembly and installation of the engine oil pump sprocket:

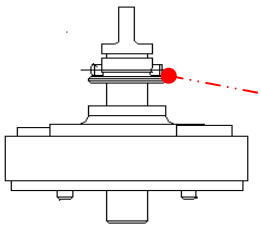
Disassembly of the engine oil pump sprocket

1. Remove 2 set screws on the engine oil separator and take out the engine oil separator.
2. Use the long nose pliers to remove the E-ring and the flat washer.

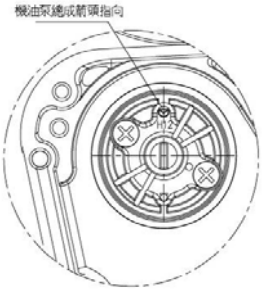
3. Remove the drive sprocket and the drive chain of the engine oil pump.

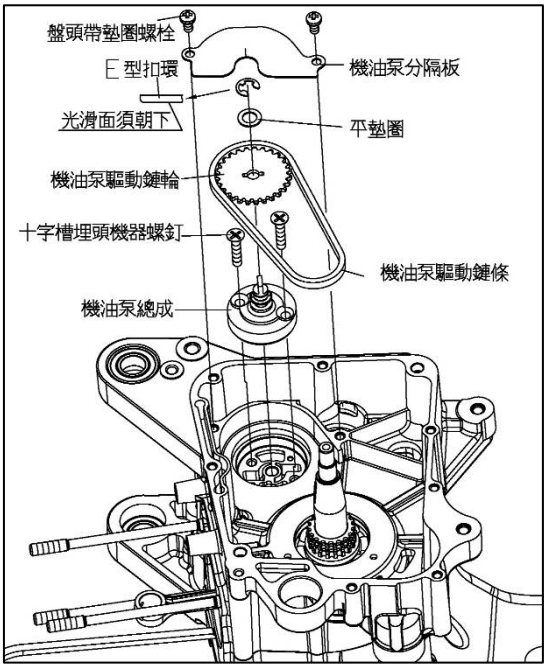
4. Remove 2 set screws on the engine oil pump and take out the engine oil pump.

Note: Any pin should not be lost or dropped during assembly of the engine oil pump.



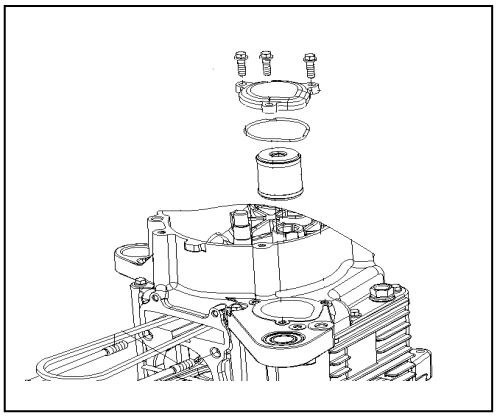
Note: Align the drive shaft of the engine oil pump during assembly.





■ Engine oil filter

A. Remove 3 set screws on the engine oil filter cover and take out the engine oil filter.
B. Install the cover with the filter element replaced and installed. Keep watch for the washer correctly installed. (Replace the filter element and the washer simultaneously.)
C. Tighten set screws with the cover and the washer correctly installed.

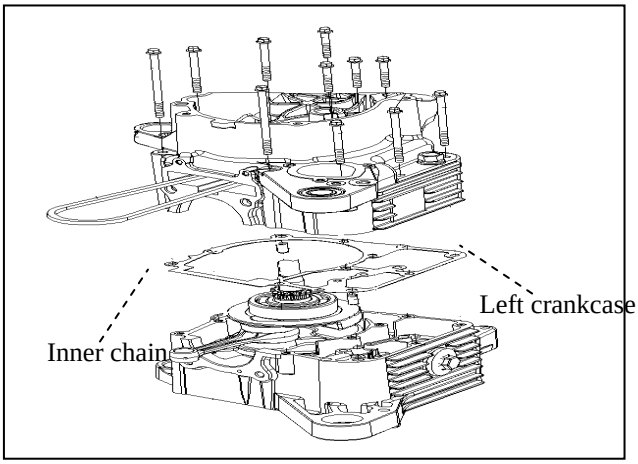


Note: Replace the filter element (engine oil) every 5000km.

Crankcase

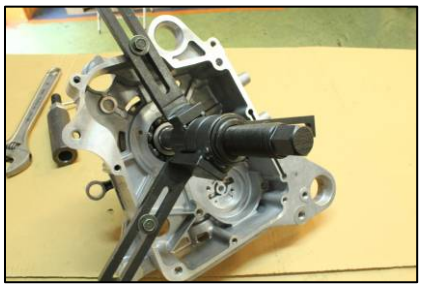
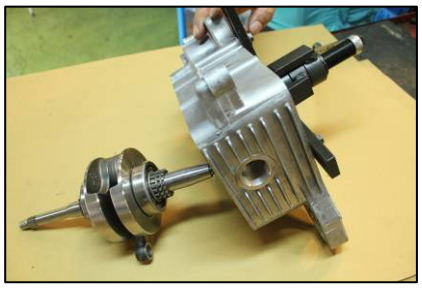
■ **Left crankcase**

Remove 11 set screws on the crankcase; place the inner chain horizontally and inward; take out the left crankcase.



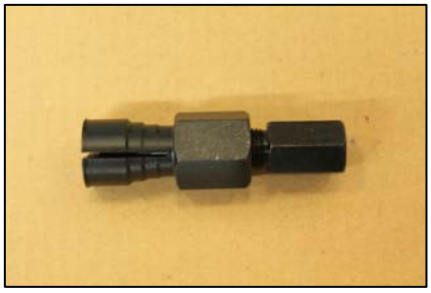
■ **Right crankcase / crankshaft**

As a result of tight fit between the right bearing of the A1 engine crank and the right crankcase, the specific tool for removing the crankshaft should be used to separate the crankshaft and the case during disassembly. Do not use a hammer to strike any part.

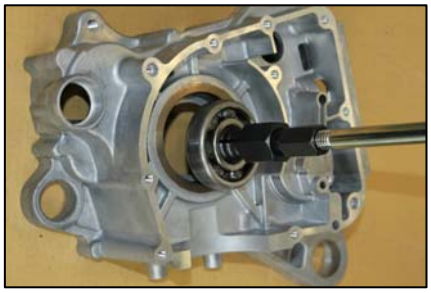
■ **Removal of the crankshaft bearing**

1. Tool to remove a bearing (bearing puller)



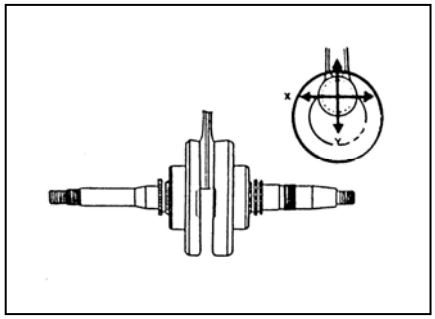
2. Connect and fix a bearing puller into a bearing to be removed; then install the puller hammer.

3. Securely fix the right crankcase with the puller hammer installed for the bearing pulled out.

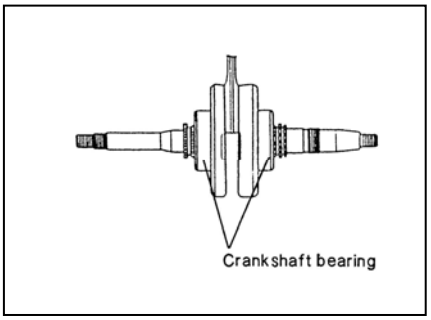


■ **Evaluation and measurement of a removed crankshaft**

1. Check the connecting rod for any noise attributed to large radial and axial clearances of a running crankshaft. Replace the useless crankshaft assembly with a new one if necessary.
2. Check the bearing for any noise attributed to large radial and axial clearances of a running bearing. Replace the useless bearing (or crankshaft assembly) with a new one if necessary.



Check axial and radial clearances



Check a bearing

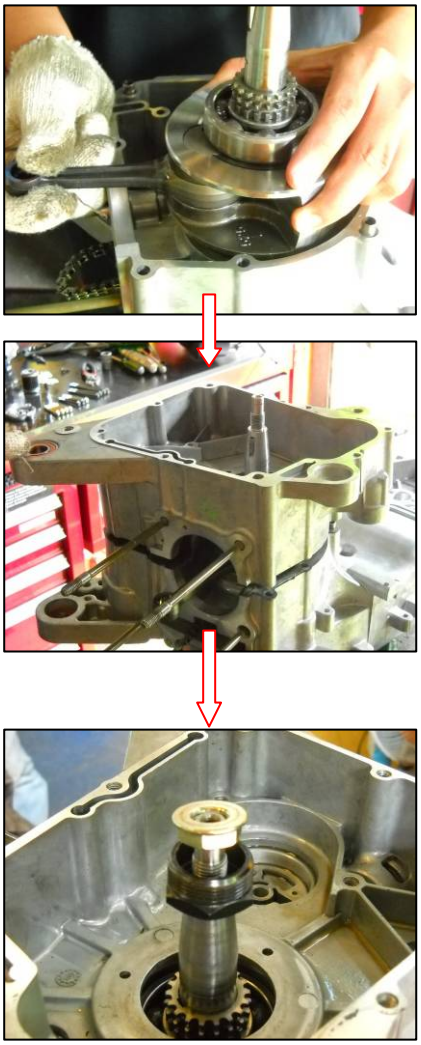
Installation of the crankcase

■ Method (1)

Install the bearing and the engine oil pump sprocket on the crankshaft first.

Clean the washer first and the crankcase; install all parts into the crankcase in a reverse order.

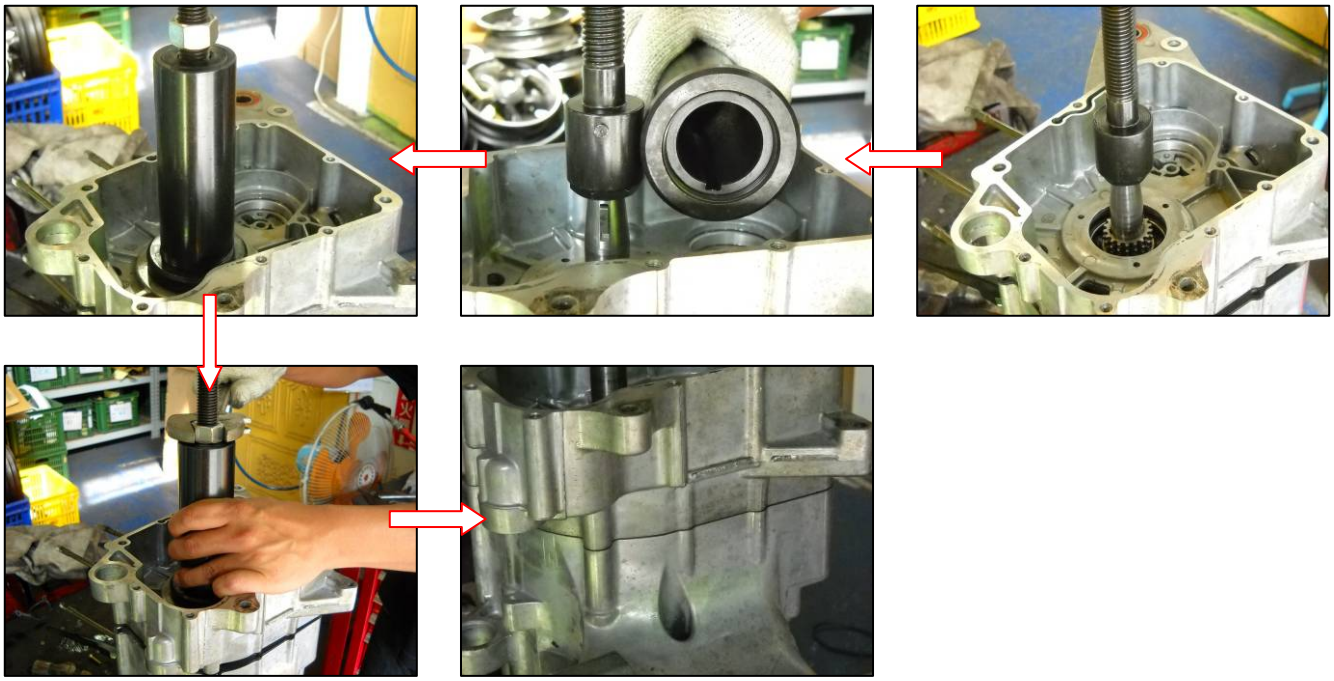
1. Horizontally place the case on the workbench.
2. Install the inner chain.
3. Cautiously place the crankshaft into the case.
4. Install the washer and then the right crankcase cover.
5. Install the crankshaft with a specific fixture; fix set screws for the fixture on the crankshaft.
6. Reversely screw and fix the set nuts.
7. Tighten set nuts on the fixture.
8. Fix the fixture sleeve and screw nuts. (Use the fixture to press the crankshaft.)
9. Screw nuts and check if the contacting surface of the case is sealed.
10. Remove the fixture.



⚠ Perform the previous steps by placing a wooden pad under the case and using a press in the event of no specific fixture employed.

⚠ Do not use any hammer to strike the case; prevent the shaft hole or the crankshaft from damage.

⚠ In view of tight fit of the engine's assembled right bearing housing, please avoid striking the case during installation.

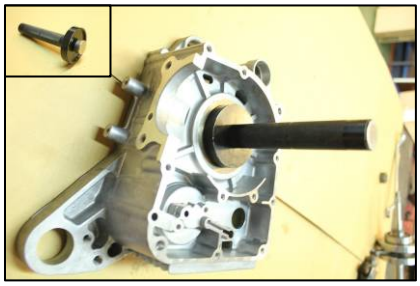
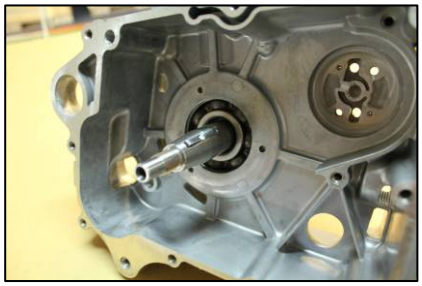


■ Method (2)

Separate the bearing and the engine oil sprocket

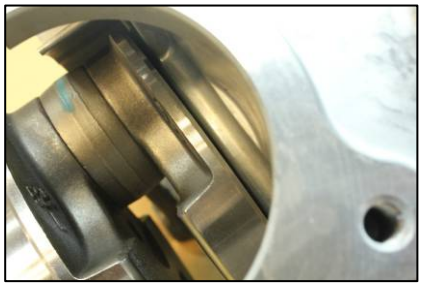
1. Use the fixture to install the bearing onto the bearing housing of the right crankcase.

2. Install the crankshaft in place.

3. Install the fixture for the crankshaft.

4. Draw the crankshaft to the bottom.



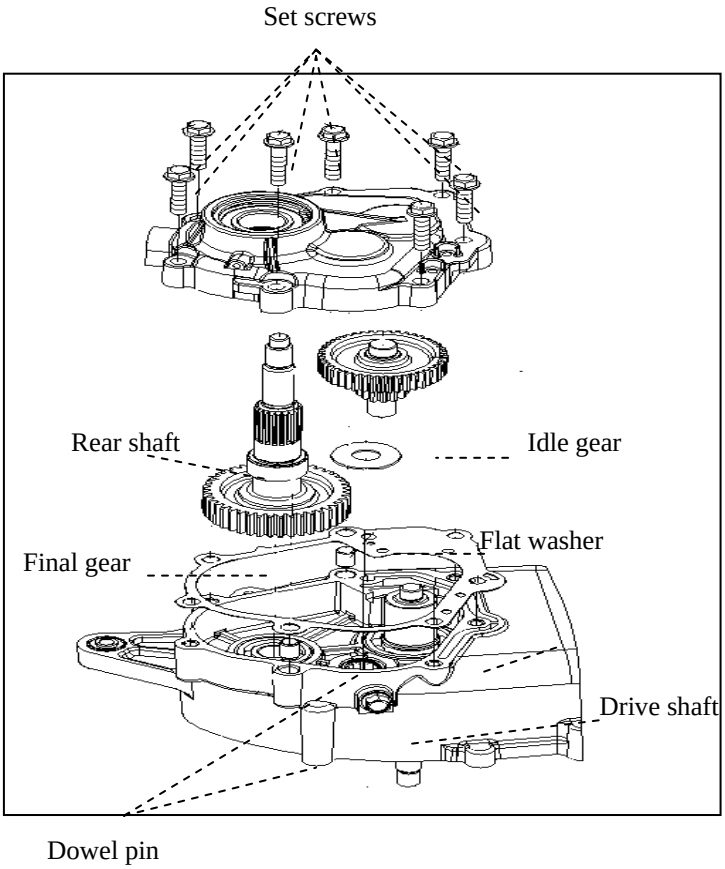
5. Install the engine oil pump sprocket; use the fixture to press the sprocket.

Final drive gear

Steps for removal:

1. Remove the drain plug bolt and drain the gear oil.
2. Remove 7 set screws on the gear box cover; take out the gear box cover.
3. Remove the rear shaft.
4. Final gear
5. Idle gear and flat washer
6. Drive shaft

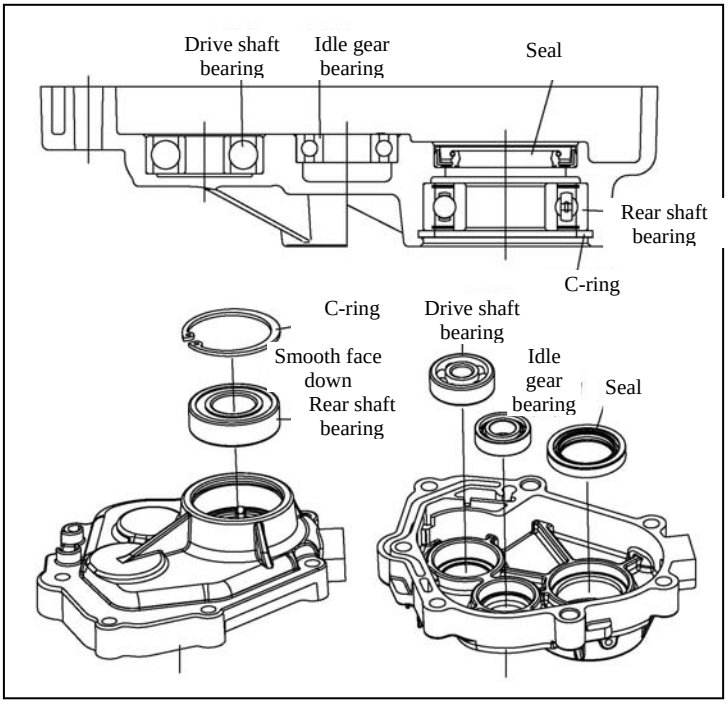
⚠ Please always renew any washer during assembly.



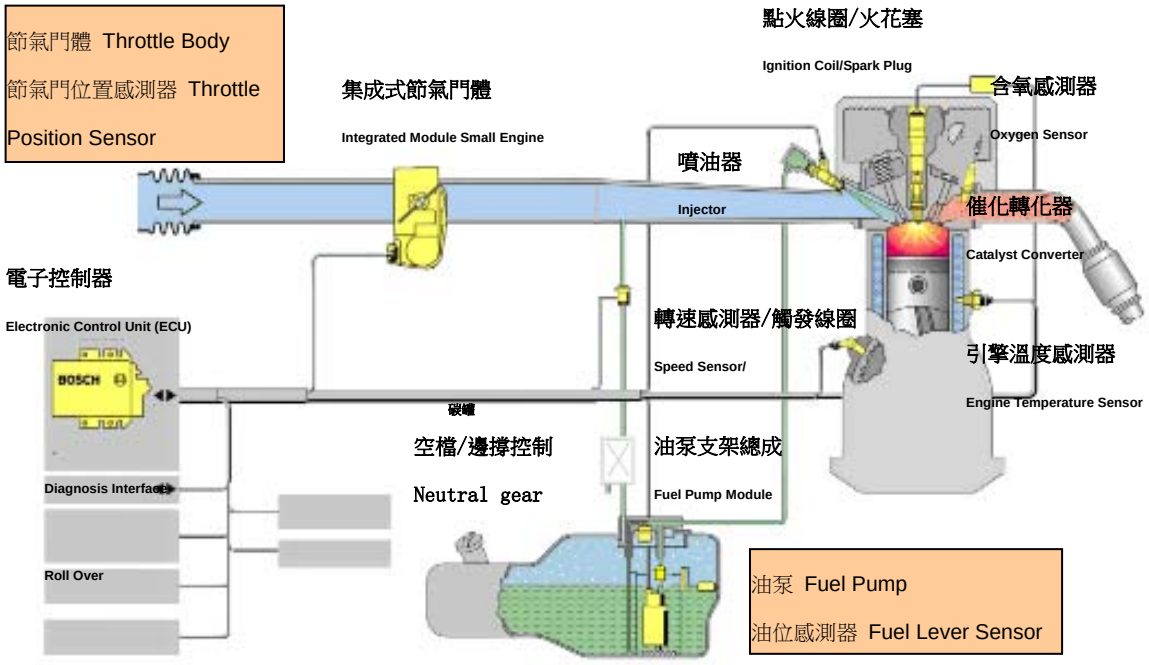
Gear box cover

Steps for removal:

1. Check each bearing which is removed from the final drive system.
2. Change any useless bearing, if any.
3. Remove the C-ring with a C-ring puller.
4. Remove the used bearing with a bearing puller.
5. Use the tool for installation of a bearing during assembly.



Configuration and performance of parts in the MSE3.0 gasoline engine's electronic control unit



11-1 ECU

Principle:

Electronic Control Unit (ECU) is the brain of the whole electronic system. ECU is effective in analyzing and processing information supplied by sensors and issuing conclusion-induced commands to any actuator for optimization of the running engine.

ECU's appearance

Function:

1. Receive signals from the engine's RMP sensor.
2. Receive signals for the engine's load.
3. Control injection of fuel.
4. Control ignition.
5. Control the idle speed.
6. Supply power (5V/100mA) to any sensor.
7. RPM signal outputs (TN signal)
8. Vehicle speed signal inputs
9. Diagnose troubles of actuators and sensors.

Case lvel: Ingress Protection, IP54K

Microcomputer system:

Microcontroller: 512k FLASH; program memory: 36K RAM

Short-circuit protection:

Under the normal status, the short-circuit protection is applicable to all pins (for ECU's inputs and outputs) to battery's voltages and GND except Pin# 2 & 21 (to GND) and Pin# 5 & 23 (to power supply).

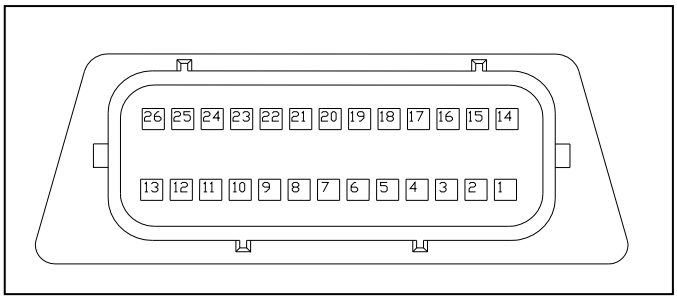
Limit:

Battery voltage: Smallest operating voltage=9V

Temperature: Operating temperatures: -40～+70

Storage temperature: -40～+90

PIN



ECU Pin Configuration

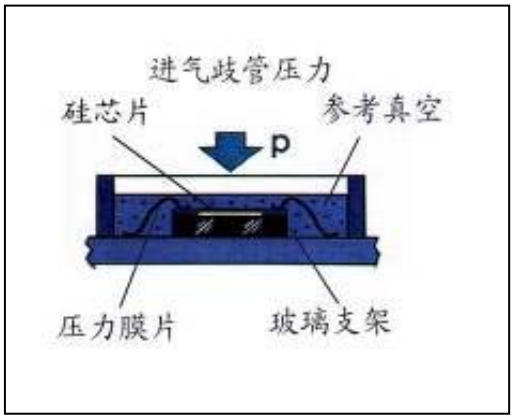
ECU Pin	**ISA-TEV +canister purge(TEV)** **TEV (ISA)+Evaporative Emission Control**
1	Ignition1/CDI / 點火
2	GND (Ignition, power) / 點火接地
3	Vehicle speed sensor or else input / 車速感測器或其他輸入
4	MIL / 故障指示燈
5	KL15 / 點火開關
6	intake air temp.(ADC) / 進氣溫度感測器
7	Output / 輸出
8	A/D input / A/D 輸入
9	Input / 輸入
10	5V ex.supply / 電源
11	KL15 / 點火開關
12	Engine speed sensor B / 轉速感測器 B
13	Engine speed sensor A / 轉速感測器 A
14	Injector / 噴油控制
15	Lambda sensor heater / 氧感測器加熱
16	canister purge TEV/ Auxiliary start relay / 碳罐閥控制或輔助起動繼電器
17	ISA-TEV / TEV 作為怠速執行器
18	Coolant temp. (ADC) 引擎溫度感測器
19	Intake air pressure sensor / 進氣歧管壓力感測器
20	Throttle pos / 節氣門位置感測器
21	GND (sensor) / 感測器接地
22	Fuel pump Relay / 油泵繼電器
23	UBD 持續電源
24	Lambda sensor / 氧感測器
25	Engine speed output / 引擎轉速輸出
26	K line / K 線

11-2 Intake manifold pressure sensor

Function:

Monitor absolute pressures (kPa) in the intake manifolds; provide information about the engine load.

Rang of pressures monitored: 10~115kPa



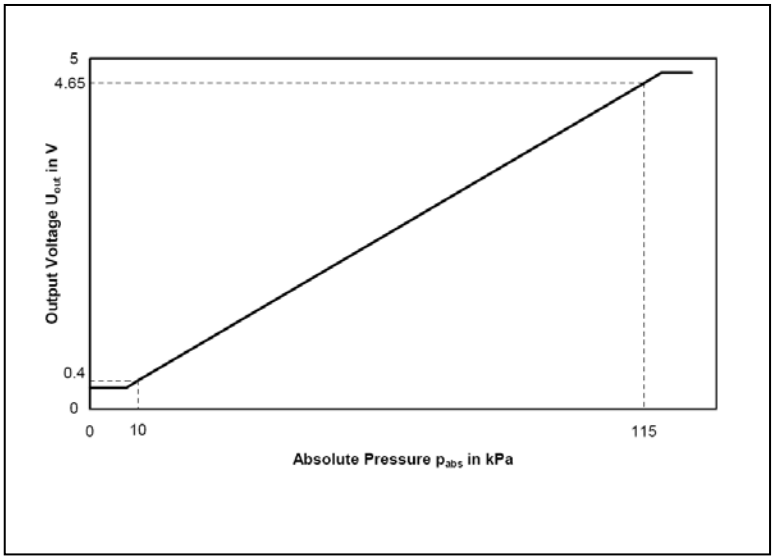
Intake pressure sensor

Principle:

Due to any change in the intake manifold's pressures causing deformation of a pressure sensor's diaphragm, the piezo-resistance effect makes resistance changed and further developed to be signals (voltages) proportional to pressures under a processor chip's functions.

Characteristic data:

Measurement	Value			Unit
	Min.	Classic	Max.	
Range for the pressure test	10		115	kPa
Operating Temperature	-40		125	°C
Operating Voltage	4.75	5.0	5.25	V
Current for U_S=5.0V	6.0	9.0	12.5	mA
Current of the output circuit	-0.1		0.5	mA
Response Time			1.0	ms

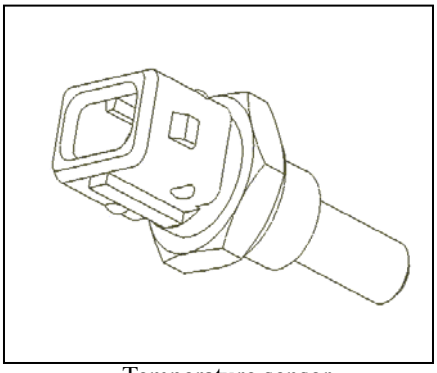


Pressure sensor's characteristic curve

11-3 Temperature sensor

Function:

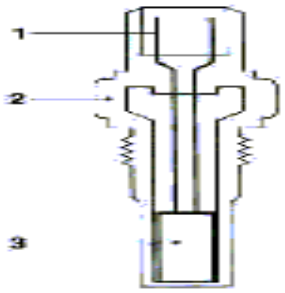
The sensor is used to provide information about water coolant, cylinder temperature, or intake temperature.



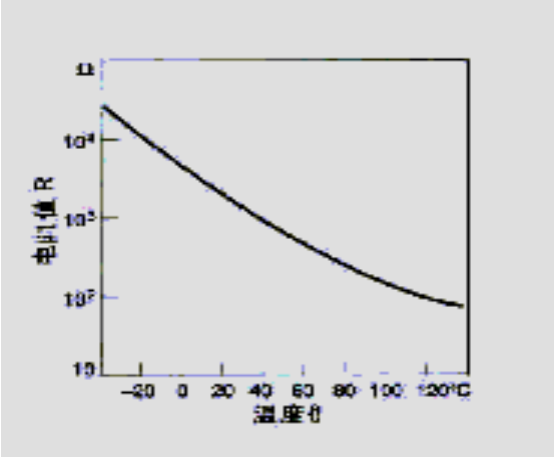
Temperature sensor

Principle:

As one NTC (Negative Temperature Coefficient) thermistor, the temperature sensor has its resistance descending with the water coolant's ascendant temperatures in which there is no linear relationship.



Sectional view of a temperature sensor:
1. Electric connector; 2. Bushing; 3. NTC thermistor.



Fault diagnosis:

Any error signal for the temperature of water coolant or the cylinder higher than the upper limit will be indicated on the dashboard. However, the temperature of the water coolant or the cylinder less than the lower limit may not be attributed to a defective temperature sensor but the engine just started or warm-up. In the event of any error signal still indicated on the dashboard with the possible trouble excluded, please test the component.

Method of measurement: Dip the temperature sensor inside hot water at 80℃ first; take out the sensor and measure resistance. If normal, please check other circuits of the engine temperature sensor.

Measured data**:**

Temperature	Resistance
-10℃	10 · 28 kΩ
+20℃	2 · 5 kΩ ±5%
+80℃	0 · 345 kΩ
Range of temperatures	-30℃~+130℃

11-4 LSF Lambda sensor

Function:

Test the oxygen content in exhaust to make sure of the mixture of gasoline and air completely burned and promote the Air/Fuel Ratio precisely controlled by ECU.

Theoretical Air/Fuel Ratio: 14.7:1

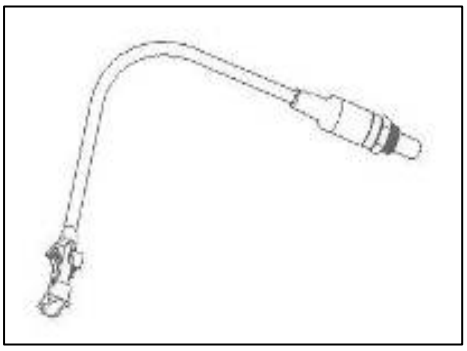


Fig. 11-4.1, Lambda sensor

Principle:

When a ceramic tube's temperature is up to 350℃, the solid ceramic electrolyte is conductive and the oxygen molecule inside and outside ceramics is catalyzed to oxygen anion, which freely moves inside ceramics, by the sensor's platinum electrode so that oxygen molecule thereof diffuses via ceramics. Due to this characteristic, the difference in concentrations of oxygen inside and outer ceramics could be transferred to the potential difference and further electrical signal outputs. In virtue of the signals' voltages changing at the theoretical equivalent air/fuel ratio (λ=1), it is necessary for a gasoline engine to keep the excess air coefficient λ in the range between 0.85 and 1.10, shown as follows.

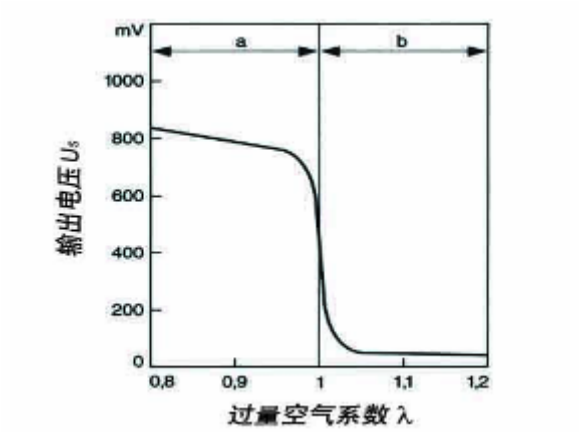


Fig. 11-4.2, Characteristic curve of a Lambda sensor at 600°C

Excess air coefficient (λ): Ratio of a mixed gas's actual air/fuel ratio to a theoretic equivalent air/fuel ratio.

λ=1: Mixed gas's actual air/fuel ratio = theoretic equivalent air/fuel ratio;

λ>1: Mixed gas's actual air/fuel ratio > theoretic equivalent air/fuel ratio; thin mixed gas; voltage output low (about 100mV)

λ<1: Mixed gas's actual air/fuel ratio < theoretic equivalent air/fuel ratio; thick mixed gas; voltage output high (about 800mV~1000mV)

Fault diagnosis

A variety of signals from different sensors, actuators, power amplifiers and detection circuits are monitored by ECU. In the event of each of the following situations detected by ECU, the corresponding PCODE for a Lambda sensor might be indicated on the dashboard. (Refer to "Conditions of error information & records".)

1. Error of a Lambda sensor's signals
2. Error of a battery's voltages
3. Error of signals of an intake manifold's absolute pressures
4. Error of signals of an engine's water coolant temperatures
5. Error of a nozzle's functions

For any PCODE with respect to a Lambda sensor indicated on the dashboard, the close loop control system is terminated but the open loop control system is activated as per the fundamental injection MAP saved in ECU to dispense fuel.

◙ Acceptable fuel additives: unleaded gasoline; gasoline with the lead content of 0.15g/L.

Lead in Gasoline (g/L)	Service Life (km)
≤0.6	30000
≤0.4	50000
≤0.15	80000
≤0.005 (Unleaded gasoline)	160000

Constitution:

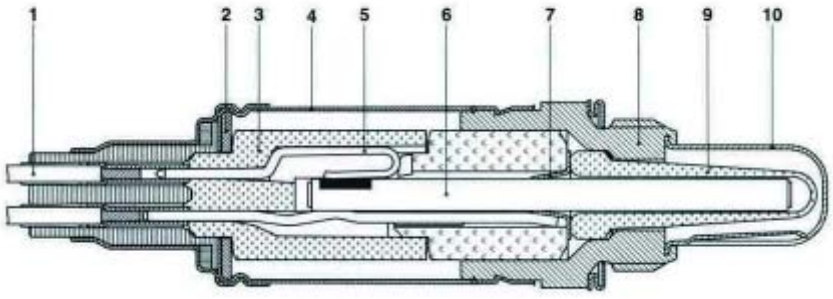


Fig. 11-4.3, Sectional view of a heated Lambda sensor

1. Signal line
2. Dish washer
3. Lower isolating bush
4. Sheath
5. Wirework
6. Heater
7. Washer
8. Sensor support
9. Ceramic probe
10. Protection tube

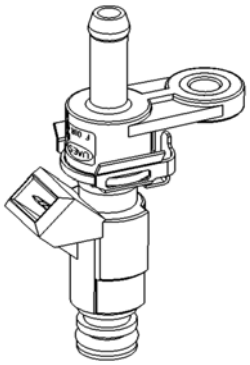
11-5 Electromagnetic fuel nozzle

Function:

Subject to ECU, the fuel nozzle injects atomized fuel into the engine in the specific timing.

Constitution:

EV-Cup; clamp; EV



Principle:

Developed by the fuel nozzle coils with electrical pulse supplied from ECU, the magnetic force will increases to overcome a resultant force composed of the return spring's pressure, the needle valve's gravity, and friction and makes the needle valve lifted and fuel injected. The needle valve's lift range is not more than 0.1mm. With the pulse thereof interrupted, the needle valve is closed again by the return spring's pressure.

Fault diagnosis:

The system does not diagnose any fault of the nozzle itself but the nozzle driving system. Any PCODE will be displayed on the dashboard in the event of a short circuit (or overload) between the nozzle driving system and the battery or a short (open) circuit between the nozzle driving system and GND. In case of any situation thereof, the close loop control of the Lambda sensor and prior self-learning control is terminated; the latest self-learning data is employed. Delete the PCODE with any fault eliminated.

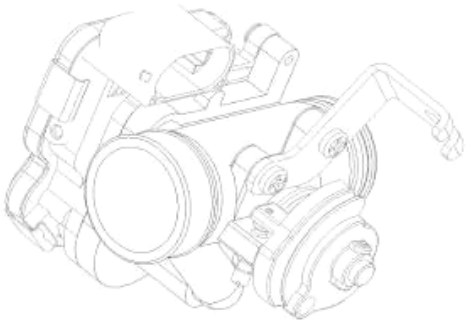
Requirements for installation

A. For easy installation, please apply the clean silicon-free engine oil on the surface of the top O-ring connecting the fuel manifold. Be careful of no engine oil contaminating the nozzle and orifices.
B. Install the nozzle by hands; do not strike the nozzle with a hammer.
C. The O-ring should be replaced during disassembly and installation of the nozzle. Do not damage the nozzle's sealing face.
D. The supporting washer on an O-ring should not be removed from the nozzle. Do not damage any part on the nozzle such as fuel inlet, O-ring, supporting ring, orifice plate, and outlet. Do not use any damaged part thereof.
E. Perform an airtight test for the nozzle's parts and ensure no leakage with installation completed.
F. Remove any defective part by hands. Take out the clamp and then the nozzle from the nozzle cap.
G. Keep a removed nozzle clean without any contamination.

11-6 DKG (Throttle sensor)

Function:

The sensor can provide information about a throttle's opening to ECU. According to the information thereof, ECU has necessary data for engine load, operating status (start-up, idle speed, partial load, and full load), acceleration, deceleration, etc.



Principle:

As one angle sensor for linear output, this sensor is composed of two curved slide resistors and two contact sliders. The contact slider has its spindle connected to and aligned with the throttle's axle. The voltage of 5V, U_S, is applied to the slide resistor's both ends. With the throttle turning, the contact sliders also turn and move on contact sliders for output of U_P at any contact. Therefore, the sensor is also a potentiometer for output of angles.

Fault diagnosis:

For the throttle's turning angle greater than the upper limit or less than the lower limit, any PCODE of the throttle sensor will be indicated on the dashboard. Turn a multi-meter's rotary switch to the "Ω" function ("DCV" function) for measurement of resistance (output voltage). In the event of any data beyond the spec., the sensor might be failed. For an individual sensor with regular functions, please check other circuits for any short (open) circuit.

Measurement:

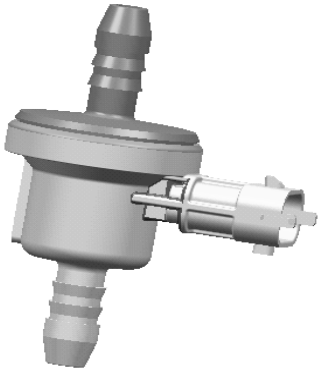
Input voltage: 5V

Throttle sensor	Output voltage	Resistance measurement (Individual sensor)
Full close	0.09V	710Ω~1380 Ω
Full open	0.96V	1.2 KΩ~2.4KΩ

11-7 Idle speed actuator

Function:

Based on ECU's information for the engine load, the idle speed actuator is used in controlling the bypass airflow by means of the duration and the frequency (duty factor) of electrical pulse.



Principle:

The idle sped actuator is composed of electromagnetic coils, armature iron, and valve. The airflow passing the idle speed actuator is relevant to both the duty factor of pulse exported to the idle speed actuator by ECU and the pressure difference between the inlet and the outlet of the idle speed actuator. The idle speed actuator is disabled during no supply of electrical pulse.

In the case of a duty factor of 100% (full open), the airflow passing two types of idle speed actuators will be different. As shown in figures below, the airflow is 3.0m^3/h and 6.5 m^3/h while detected in the idle speed actuator TEV2 (full open; pressure difference: 200mbar) and TEV5 (full open; pressure difference: 700mbar).

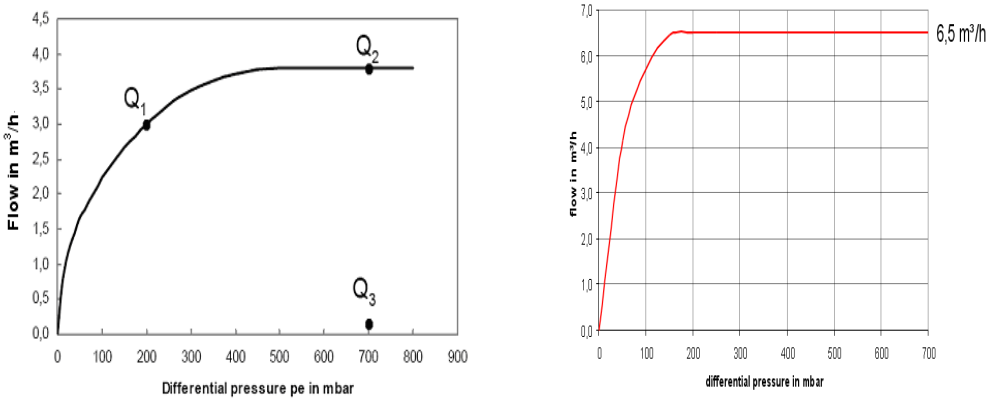
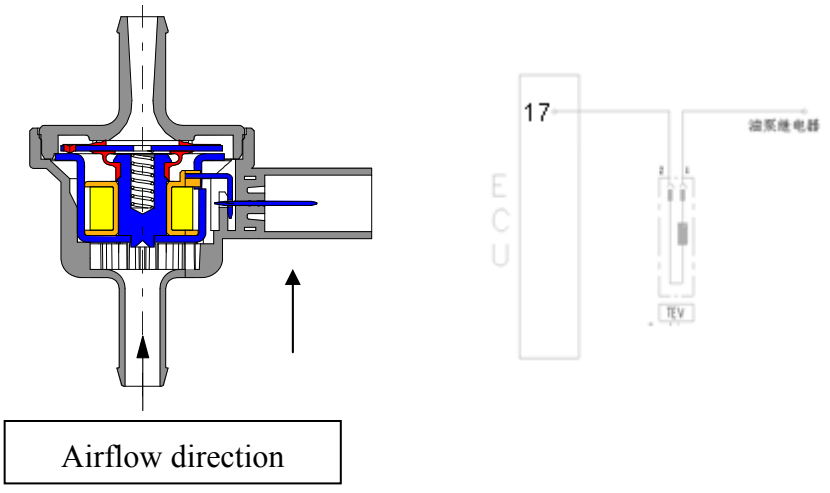


Fig. 2-31, Airflows in idle speed actuators (Left: TEV2; right: TEV5)



Fault diagnosis

ECU is effective in diagnosing both the idle speed actuator and the driving system. In the event of a short circuit (or overload) between the idle speed actuator's driving system and the battery or a short (open) circuit between the idle speed actuator's driving system and GND, the close loop control for dispensing fuel and the idle air volume learning are terminated but the latest self-learning data is employed.

Notices for maintenance:

Root causes of general troubles: Rustiness or airtight characteristic deteriorated due to any foreign object in the valve.

① Airflow direction conformable to spec. during installation;
② Check and replace the idle speed controller in case of failure of the controller due to some black particles inside the valve;
③ No liquid such as water and oil entering into the valve during maintenance;
③ In order to avoid any solid-borne noise, connect the idle speed controller to a hose without the controller contacting any other supports.

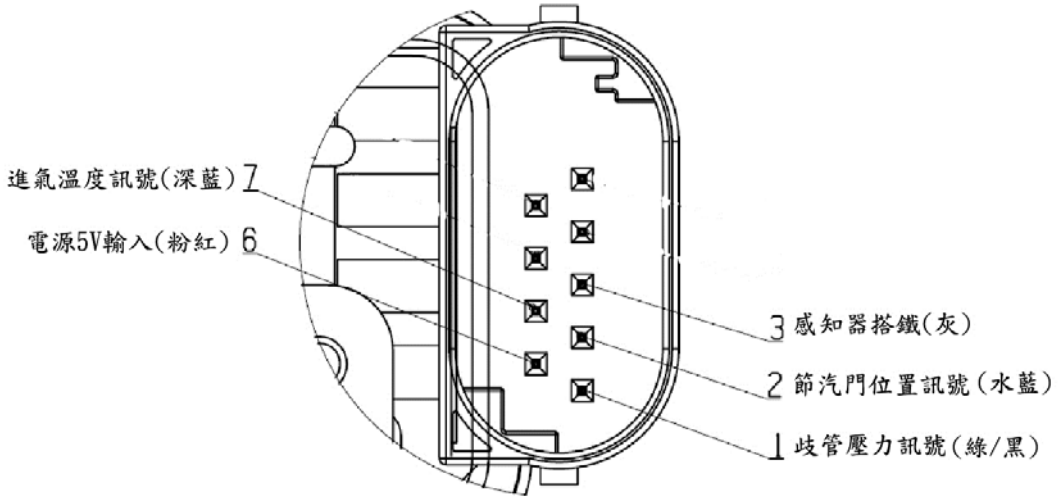
Method for measurement (simplified):

Disconnect the connector; turn a multi-meter's rotary switch to the "Ω" function; connect two probes onto the idle speed controller's two pins and check if resistance is 26± 4 Ω within the spec. at 20℃.

11-8 IMSE

Introduction:

IMSE is composed of the following components: mechanical throttle valve assembly, intake temperature sensor, intake pressure sensor, throttle sensor.



Function:

IMSE provides information about the throttle body's position and intake temperature & pressure to ECU. Based on the information thereof, ECU possesses the data of air passing the throttle and entering the engine.

Principle:

① The mechanical throttle body assembly links the engine and the air filter. While driving the vehicle, the motorcycle owner intentionally controls angles of the throttle valve opened by manipulating the throttle cable. The structure and size of the throttle body's main duct directly affects the air volume absorbed into the engine. The engine's performance under different RMPs can be delivered by changing the main duct.
② The core of the intake temperature sensor is a quick-response thermistor with tits circuit as follows.

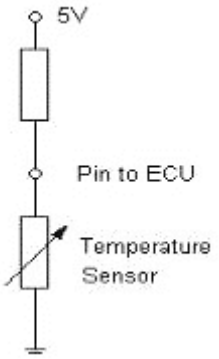


Fig. 2-34, Electric circuits of an intake temperature sensor

③ To inspect the absolute pressures (KPa) of intake air, the intake pressure sensor connects the throttle body's main duct via a pressure duct of the throttle body. The sensor is divided into the two parts: sensing element and detection circuits as shown in Fig. 2-35.

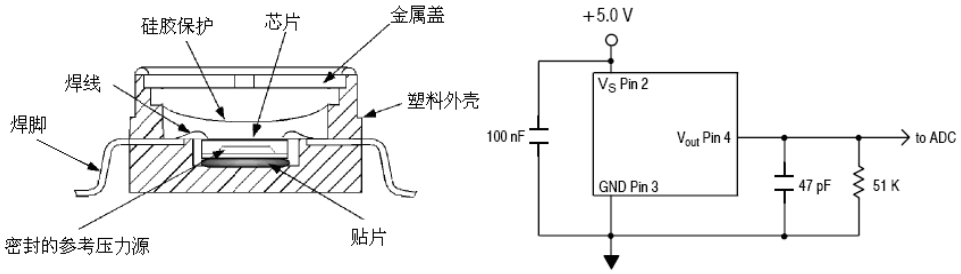


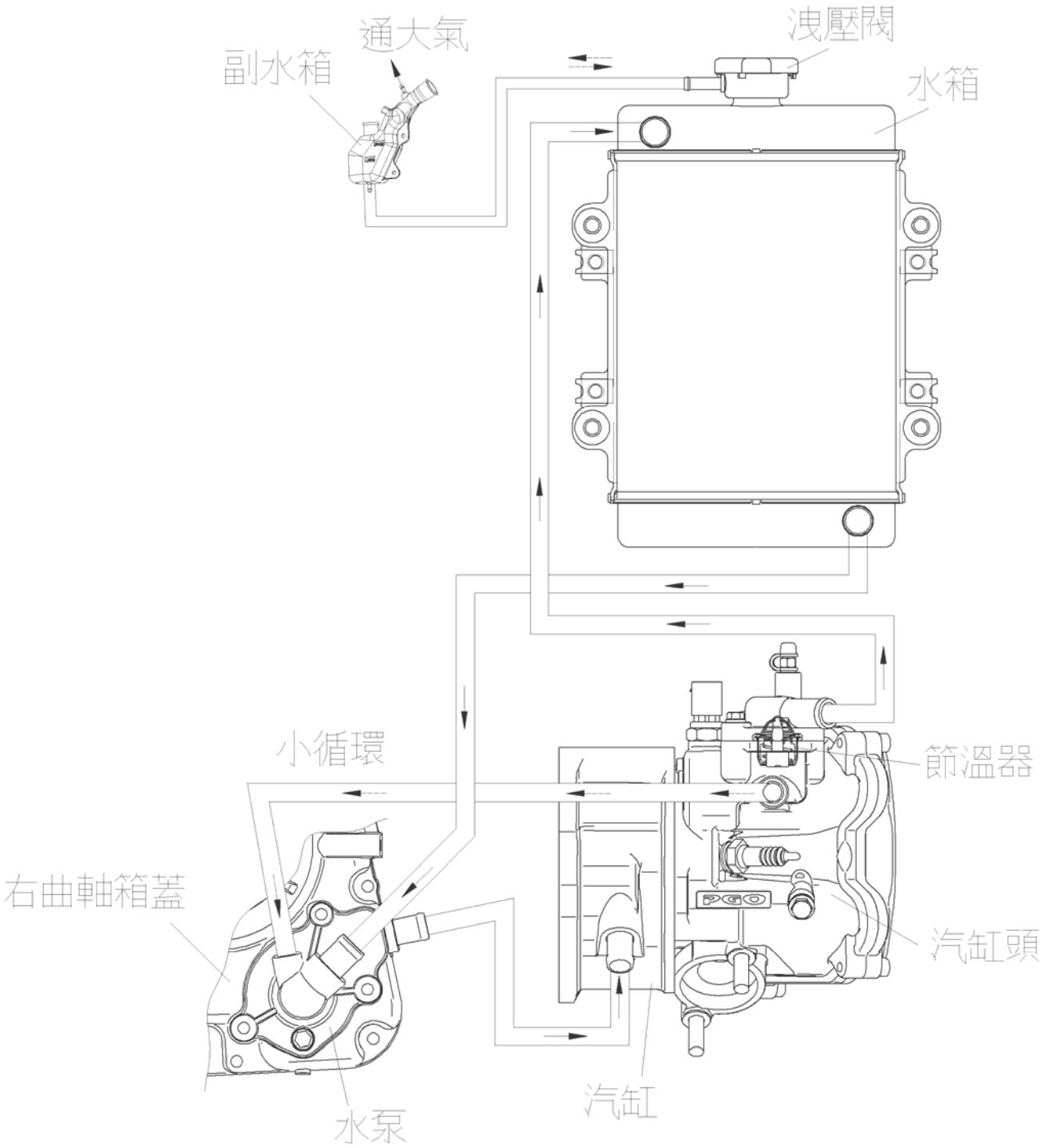
Fig. 2-35, Intake pressure sensor

The output voltages from the pressure chip will proportionally vary with changes in the main duct's pressures and be forwarded to ECU for detection of the absolute pressures in the duct.

④ Throttle position sensor

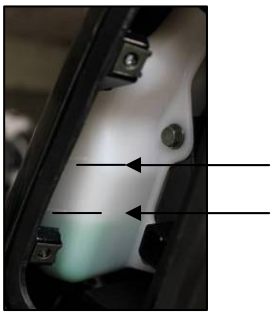
As one angle sensor for linear output, this sensor is composed of two curved slide resistors and two contact sliders. The contact slider has its spindle connected to and aligned with the throttle body's axle. The voltage of 5V, U_S, is applied to the slide resistor's both ends. With the throttle turning, the contact sliders also turn and move on contact sliders for output of U_P at any contact. Therefore, the sensor is also a potentiometer for output of angles.

Cooling system diagram



System maintenance

- **Regular maintenance**
  - **Every 1000km**: Check if the coolant level in the auxiliary water tank is within the standard range, or add new coolant up to the standard, if necessary.



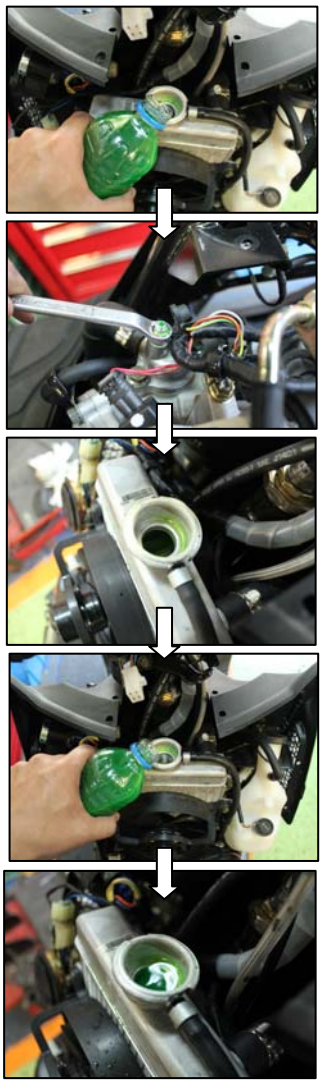
  - Check the cooling tube for any leakage in the event of coolant unusually consumed (the level below the lower limit).
  - Add the diluted coolant (**30%~50%)** with distilled water or soft water mixed. Do not add hard water, industrial water or tap water into coolant due to its mineral substance causing incrustation which adversely affects cooling efficiency or service life of the cooling system.

- **Major maintenance**

  Change the water coolant every 20,000km or 30,000km.

  - **Notes:**
    1. Do not open the water tank to burn skin in the case of the engine warm and the water tank in a high-pressure/temperature status. Continue the operation until the water coolant temperature is reduced.
    2. Only soft water, distilled water or specific additive can be added into the water coolant.
    3. Rinse any surface to which coolant is attached with fresh water.
    4. Check the system for any leakage with the cooling system having been maintained.
    5. It is recommended to cautiously replace water coolant for the engine running and the cooling fan turning due to increased water temperature.
    6. It is recommended to change any snap shackle with a new one to ensure good sealing of the cooling system.

Change coolant

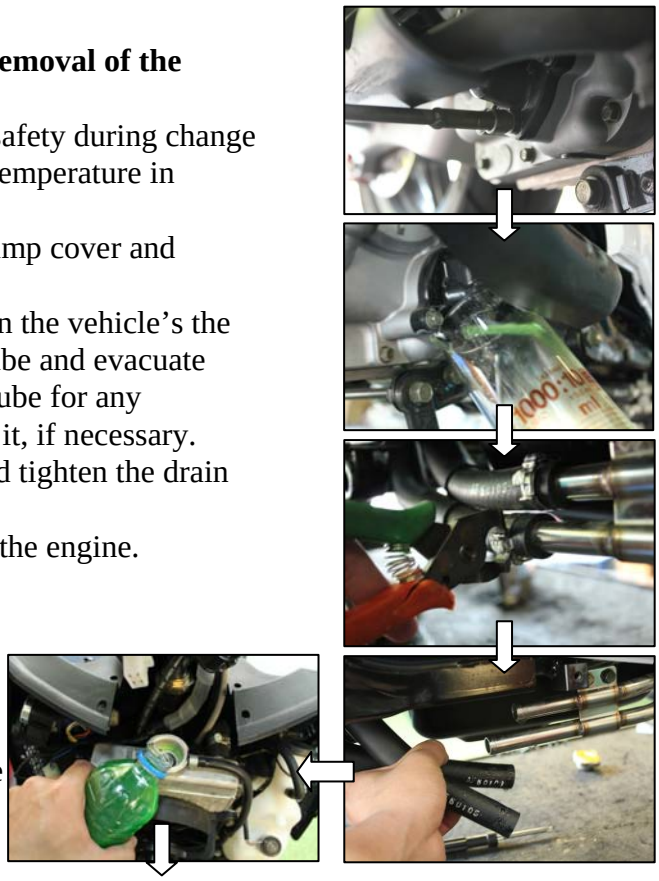


- **Steps to change water coolant (simplified):**
  1. In order to avoid burn and make sure of safety during change of water coolant, please cool the engine temperature in advance.
  2. Loose the drain plug bolt on the water pump cover and evacuate water coolant. Reinstall the drain plug bolt with water having been evacuated.
  3. Add new coolant from the inlet; start the engine with the full level reached.
  4. Make sure of the coolant temperature conformable to the circulating temperature of the thermostat with the engine started. Loose the bleed screw on the top of the thermostat; check any air remaining in the water hose and evacuate it prior to tightening the screw.
  5. During the coolant temperature gradually increased to the circulating temperature, some bubbles from coolant will be observed at the inlet (residual air evacuated by the system).
  6. Stop the engine and check coolant for addition in the event of no bubble observed at the inlet and the coolant level stable.
  7. Keep watch for the coolant level of the auxiliary water tank at the first three drives with the water coolant having been changed. Please add any water coolant up to the standard level, if necessary.

  ✓ **The volume to be replaced should be one-half of the total capacity.**

  ✓ **The simplified steps could be performed during the general minor maintenance.**

  ✓ **Total capacity to be replace: 0.55 liter**
  Concentration of coolant: 30~50%



- **Steps to change water coolant (along with removal of the cooling tube):**
  1. In order to avoid burn and make sure of safety during change of water coolant, please cool the engine temperature in advance.
  2. Loose the drain plug bolt on the water pump cover and evacuate water coolant.
  3. Disconnect the water coolant connector in the vehicle's the lower right corner; remove the cooling tube and evacuate residual water coolant inside; check the tube for any deterioration (crack or curing) or replace it, if necessary.
  4. Reconnect the cooling tube connector and tighten the drain plug bolt with water coolant evacuated.
  5. Add new coolant from the inlet and start the engine.
  6. Make sure of the coolant temperature conformable to the circulating temperature of the thermostat with the engine started. Loose the bleed screw on the top of the thermostat; check any air remaining in the water hose and evacuate it prior to tightening the screw.

7. During the coolant temperature gradually increased to the circulating temperature, some bubbles from coolant will be observed at the inlet (residual air evacuated by the system).
8. Stop the engine and check coolant for addition in the event of no bubble observed at the inlet and the coolant level stable.
9. Keep watch for the coolant level of the auxiliary water tank at the first three drives with the water coolant having been changed. Please add any water coolant up to the standard level, if necessary.

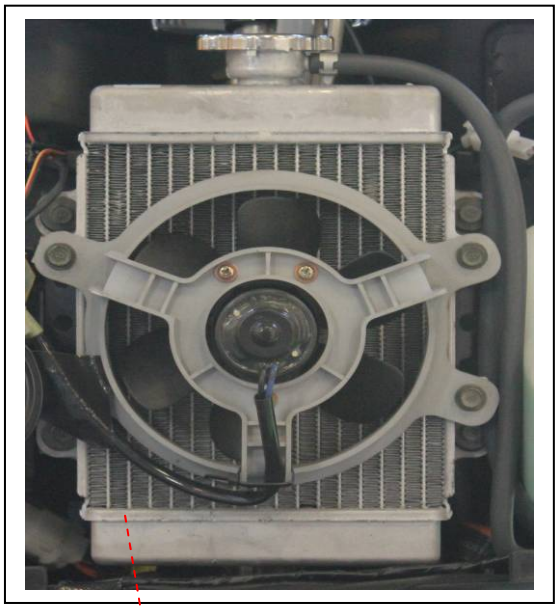
✓ **Total capacity to be replace: 1.1 liters (major cooling system)**
Concentration of coolant: 30~50%

◆ **Steps to change water coolant (cold cycle cleaning):**

1. Remove the thermostat cover; take out the thermostat; open a water tank cover.
2. Start the engine; loosen the drain plug bolt on the water pump cover to evacuate water coolant and add new coolant simultaneously for cycle cleaning (with the engine running).
   * During cleaning, other substitutes such as clean soft water or distilled water can be used to replace water coolant; however, the coolant is still added with cleaning finished.
3. Keep watch for water coolant evacuated from the drain during cycle cleaning. There has been 90% water coolant replaced in the event of the color of water coolant identical to that of new coolant.
4. Keep cleaning to consume 2,000cc coolant.
5. Install the drain plug bolt with cleaning finished; check the water coolant level and add it up to the maximum level.

✓ **Total volume replaced: 2 liter water coolant replaced for cycle cleaning.**
Concentration of water coolant: 30~50%

Water tank / fan



Check

1. Check the water tank and the fan for any damaged or deformed surface.
2. Check heat sinks for any deformation or filth; rinse heat sinks with the low-pressure water column. Cautiously restore any heat sink deformed.

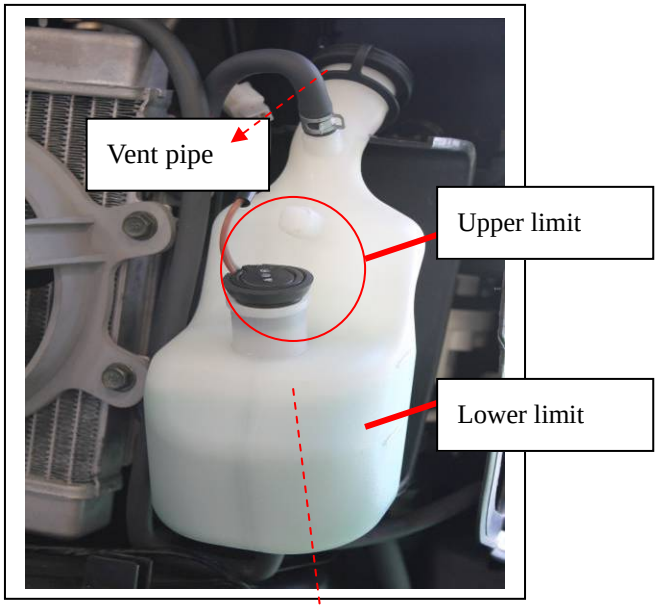
Auxiliary water tank

Total volume: 485c.c

Upper limit: 335c.c

Lower limit: 180c.c

Note: Keep the level of water coolant in the auxiliary water tank under the upper limit due to backflow and overflow of heated water coolant in the cooling system.

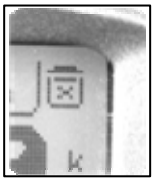


△Keep the vent pipe unobstructed and the tube not bended or jammed.

Level meter:

Function: Detect the water level of the auxiliary water tank; feedback the low level signal to the warning indicator on the dashboard when the water level below the minimum level. A user should add water coolant to the upper limit.

Turn the rotary switch of a multi-meter to the “Resistor” function for functional tests. Float at the maximum level: “Close”; float at the minimum level: “Open”. In the case of the warning indicator for the low level “ON”, please check the level meter connector for poor connection in addition to inspection of the actual water coolant.



Warning indicator on the dashboard for the low level

Thermostat

Function: Control temperature of water coolant for the engine running at the best temperature.

■ **Trouble:**

Jam:

Thermostat “ON”: Warm-up too long; engine temperature unstable during a drive.

Thermostat “OFF”: Water coolant too hot during a drive; temperature displayed on the thermometer high.

Note: Check the thermostat by immersing it into hot water.

■ **Disassembly:**

Remove 2 set screws on the thermostat cover and take out the thermostat.

■ **Installation:**

Install the thermostat in a reverse order.

△ **Put the thermostat into the cover and install the assembly into the cylinder head.**

■ **Check:**

Check the thermostat by immersing it into hot water.

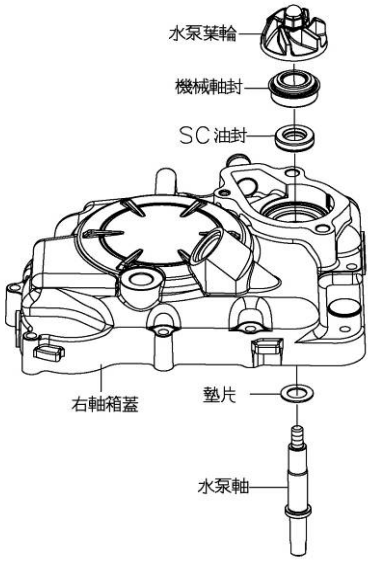
Temperature	Valve Travel
85℃±0.2	0.05mm
>95℃	3.5+1.0mm

Waterproof rubber on the thermostat not deformed or damaged

Water pump

■ **Steps to disassemble a water pump**

1. Take out the water pump cover.
2. Loosen the vane first. (Note: Left-handed screw for the vane)
3. Remove the water pump's vane clockwise.
4. Remove the crankcase cover (right).
   - ■ In order to remove the vane easily, please loosen the impeller first prior to removal of the crankcase cover (right).
5. Take out the water pump shaft and the washer.
6. Take out the mechanical seal and the SC seal.



■ **Installation**

1. Install the SC seal with the specific fixture.
   Spec.: 12- 24- 6

2. Please follow instructions for installation of any part for a high-precision mechanism such as the mechanical seal. Notices and details for assembly of the mechanical seal are shown as follows.

Note: No dust, filth, scratch, or indentation remained on the high precise seal, especially on the sliding surface. Use a piece of clean soft cloth with MEK (butanone) dipped to wipe any filth.

- ● Use the specific tool for installation of the seal.

△ **Note: Replace both the mechanical seal and the SC seal during maintenance.**

3. Screw the water pump impeller in place with the water pump shaft and the washer installed. Put the crankcase cover (right) on the engine.

△ **Note: No collision between the axle and the sliding surface for any damage generated during installation.**

4. Screw the water pump's vane with a torque wrench. Torque: 1.0~1.4kg-m

■ **Post-installation check**

1. Check of an installed mechanical seal:
   A. Make sure of the mechanical seal installed in place.
   B. Turn the impeller shaft to check any noise or unusual phenomenon.
2. Running:
   A. Do not race the water pump without any coolant added or some defects cause leakage of liquid such as sliding surface unusually heated and damage or heat cure of any rubber part.
   B. Run-in phase of the sliding surface: Incipient leakage of liquid from the assembled sliding surface is normal but gradually disappears.

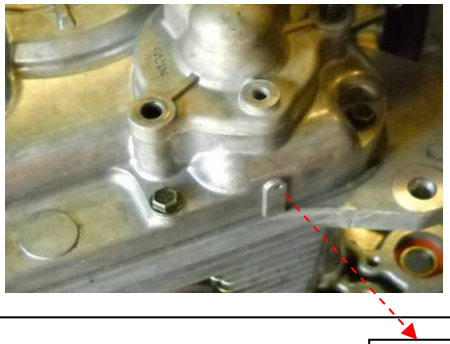
■ **Incipient leakage from the mechanical seal**

△ Manufactured in precise and non-deformed material, the seal and its sliding surface can deliver good sealing because of precise grinding and polishing. However, the leakage, so-called "incipient leakage", may be attributed to any part deformed out of fluid temperature and pressure initially. Due to change in flatness or deformation of the mechanical seal, the slightly incipient leakage may be unavoidable. Still, the ideal sealing is delivered gradually and the incipient leakage disappears after the run-in phase of the sliding surface with the vehicle continuously running.

△ With installation completed, perform the idle running for 5~10 seconds (run-in period) and do not advance the throttle for the incipient leakage avoided and good running-in of the sliding surface.

■ Check the cooling system

1. Check any engine oil or water leaking from the vent below the water pump cover on the right crankcase cover.
2. Remove the drain plug bolt and check water coolant mixed with any engine oil.
3. Remove the oil meter and check engine oil mixed with any water and becoming milky oil.



The root cause for the above situation:
1. Leakage inside the water pump seal
2. Washer at the cylinder head damaged
3. Cylinder jacket defective

Note: Check the water pump seal first prior to disassembly of the cylinder and the cylinder head.

■ Sealing performance of the cooling system

1. Change the water tank cover with a specific water tank cover for leakage tests.
2. Connect a specific air pump with a pressure gauge attached.
3. Pump air into the tank until the pressure reaches 1.1 kg/cm^2; repeatedly pump air up to 1.1 kg/cm^2 after reducing the pressure for several seconds.
4. No pressure drop is indicated on the gauge within one minute; if any, check each connector of the cooling hoses for any leakage.

■ Check the water tank cover

1. Connect the water tank onto the connector of the leakage tester.
2. Connect the specific air pump for pressure tests.
3. Standard rated pressure: 1.1 kg/cm^2. The pressure drop should be within the range of rated pressures for the pressure cap.
4. Check the pressure drop within the standard range, or change the pressure cap for the pressure drop beyond 0.1 kg/cm^2 from the standard value.

※ The purpose of the pressure cap is to increase the boiling point of water coolant with the minimum water coolant evaporated. The coolant water with pressure inside the water tank lifted beyond the rated pressure of the pressure cap will be directed into the auxiliary water tank for pressure relief.

※ Pressure high: Coolant water inside the tank directed to the auxiliary tank.

※ Pressure low: Water coolant inside the auxiliary tank drawn to the water tank.

Notices for operation:

1. Sequentially disconnect cables on the battery's terminals "-" and "+".
2. Keep watch for any spark plug's model and torque for installation.
3. Do not try fast charge except for any emergency case.
4. Use a multi-meter to test any wiring.
5. Use a spark tester to check a spark plug.

Fault diagnosis

1. No power supplied to the vehicle
   - Cables connected to a battery loose.
   - Fuse switch
   - Main switch defective
   - Battery discharged excessively

2. Voltage low
   - Battery not properly charged
   - Charging system not good
   - Voltage / rectifier not good

3. Spark plug not properly ignited
   - Spark defective
   - No ignition or improper ignition due to any defect of the ignition-related circuits
   - Ignition coils not good
   - Crankshaft angle sensor defective
   - Main power switch not good; burglar alarm continuously activated

4. Starter not running
   - Fuse blown out
   - Starter switch not good
   - Battery voltage low
   - Starter relay not good
   - Main power lock not good
   - Starter not good

5. Power supplied off and on
   - Poor connection of battery cables
   - Cable connector of the charging system loose

6. Charging system defective
   - Fuse blown out
   - Poor connection or short (open) circuit of any connector of the charging system
   - Voltage / current adjuster not good
   - Generator not good

7. Engine running not smooth
   - Ignition circuits not good
   - Ignition timing not good
   - Electrical leakage at the spark plug cap
   - High-voltage coils not good
   - Crankshaft sensor not good
   - ECU not good

8. Starter powerless
   - Battery voltage low
   - Motor defective
   - Motor or idle gear jammed by any foreign object

Check:

1. Battery

■ Voltage check

A. Use a multi-meter or a voltage meter to test a battery's voltages.

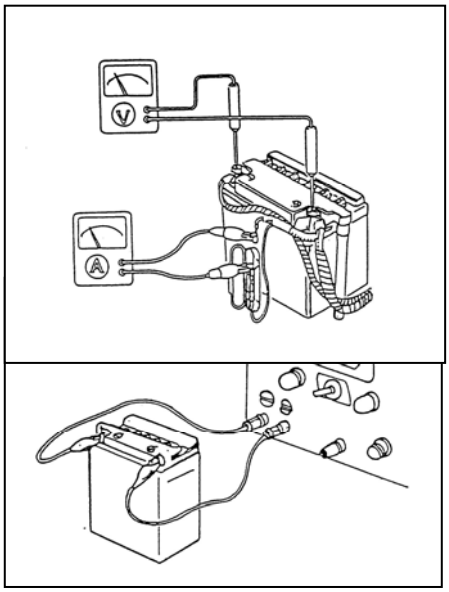
B. Voltage:

- ◆ Full charge: >12.8V
- ◆ Under charge: <12.0V
- ◆ Use a clamp meter to measure charging current by turning the rotary switch to the "current" function and hooking the fuse's "+" terminal for measurement of charging current.

■ Charge

A. Connect a charger's "+" to the battery's "+" terminal

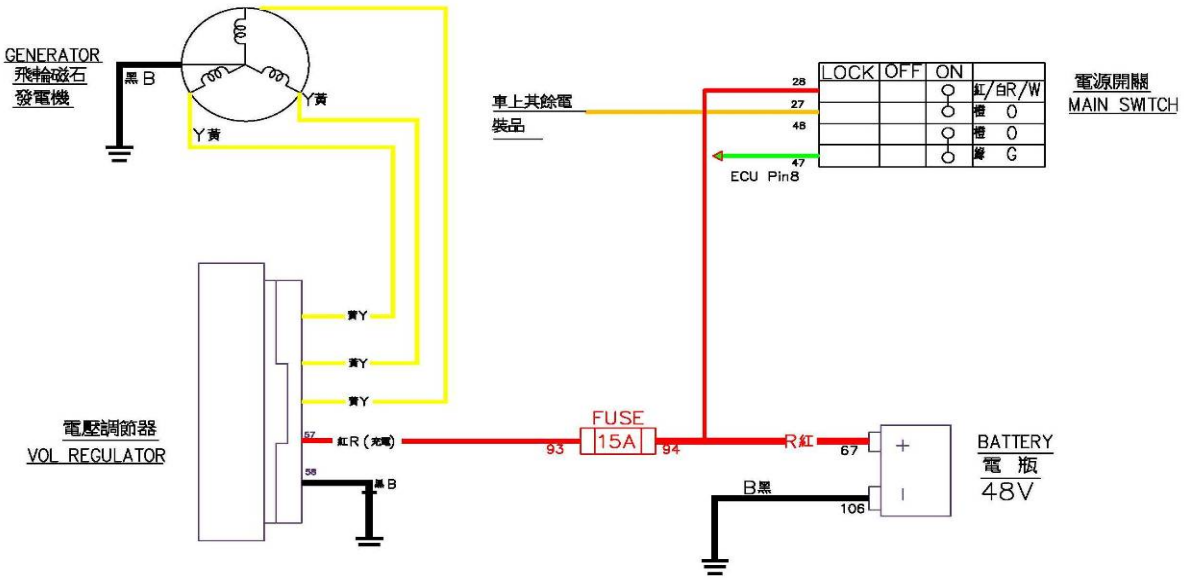
B. Connect a charger's "-" to the battery's "-" terminal



	Standard	Max.
Charging Current	**1.2A**	**5A**
Charging Time	**5~10 hours**	**1 hour**

2. Charging system

System circuits



Check circuits for charging

Item	Method for Measurement	Standard
Main switch	Power(**Orange**) & ECU(**Green**)→GUD(**Black**)	Battery voltage (KEY ON)
Battery wiring	Battery(**Red**)→Battery(**Black**)	Battery voltage
Charge coil	ACG(**Yellow**)→ACG(**Yellow**)	0.3~0.5**Ω**

Check any single part for any measured value incorrect; check wiring in the event of the part normal.

Change the power regulator for all situations normal.

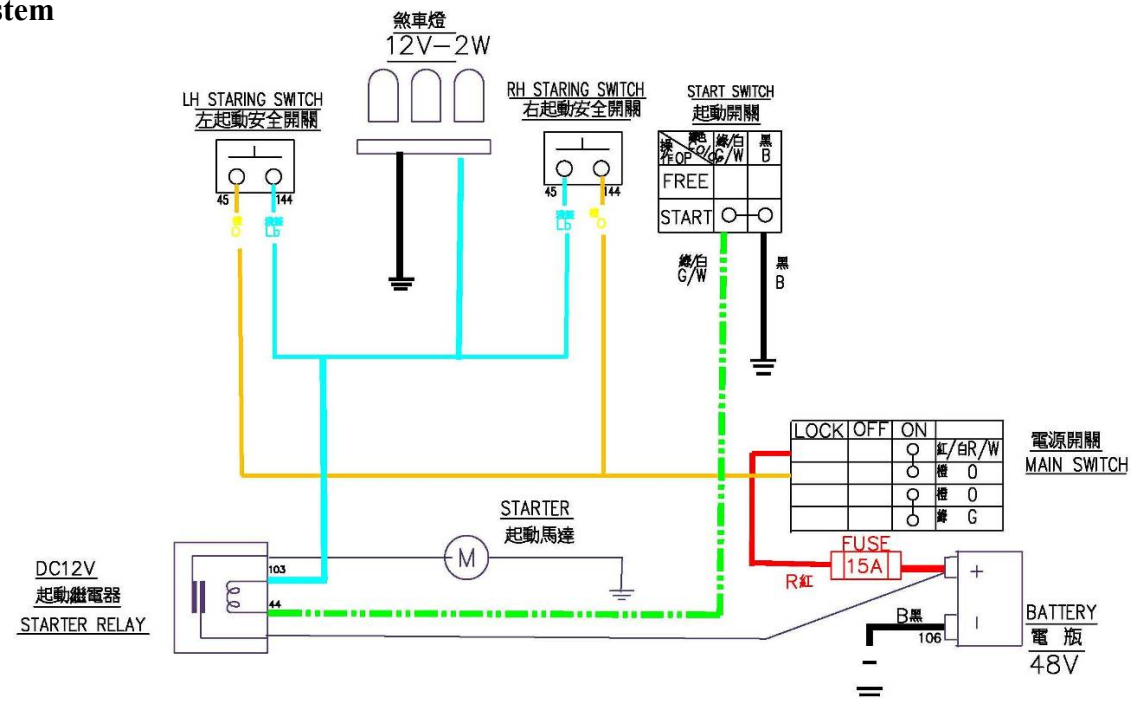
ACG charge performance

- Use a clamp meter to test charge performance by turning the rotary switch to the "current" (and "voltage") function; connect the fuse's "+" to measure current (and voltage) at charging.

	Day		Night	
RPM	Voltage	Current	Voltage	Current
1600	14.45	0.94	13.23	0.5
3000	14.47	0.95	14.16	1.45
4000	14.48	0.86	14.18	1.35
5000	14.48	0.87	14.18	1.27
6000	14.48	0.86	14.20	1.14
7000	14.49	0.85	14.20	1.15

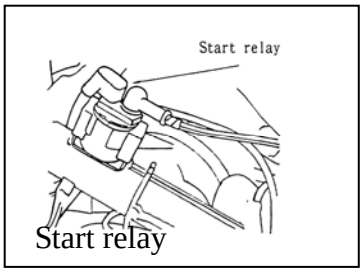
- Some errors are expectable for each battery's distinct status.
- The data shown in the table is derived from a good battery.

3. Starter system

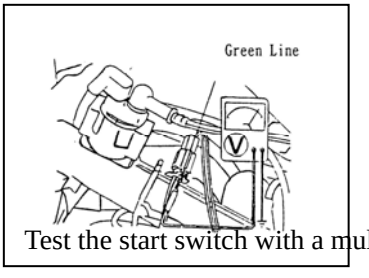


Check circuits of the starter system

1. Turn the main switch and press the brake lever to start the engine. Any "click" heard implies the start relay normal.
2. Disconnect the "+" terminal (Red) of the start relay, i.e., wiring connected to the starter.
3. Turn a multi-meter's rotary switch to the "**Ω**" function and connect "+" of the multi-meter (Red) to the motor.
4. Turn the start switch and start the engine; check the multi-meter.
5. Please change the start relay in the event of "OPEN" shown on the multi-meter.
6. Check the start switch with a multi-meter by connecting Green/White (+) and Black (-) in the event of the start relay normal.

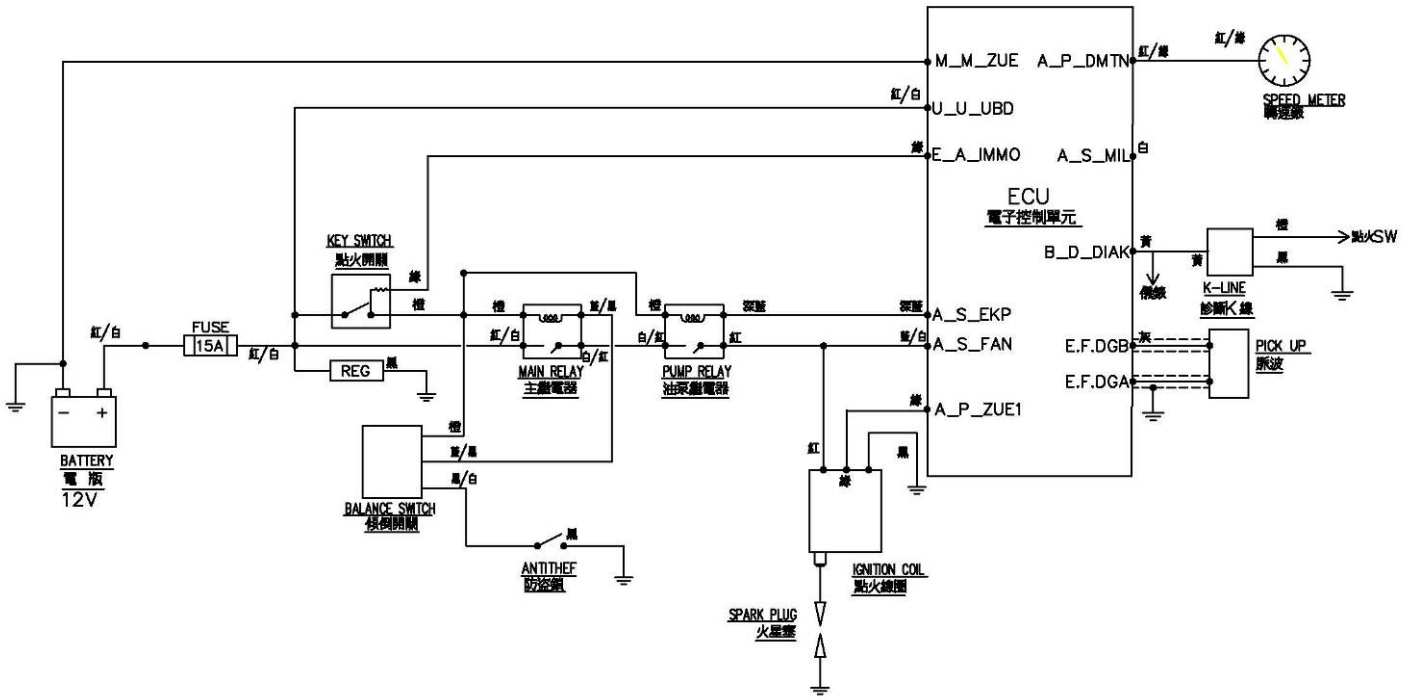


Start relay



Test the start switch with a multi-meter

4. Ignition system



Check the ignition system

1. Measure the first circuit (Red) & (Black); resistance: 0.8~1.3**Ω.**
2. Disconnect the high-tension wire; resistance: 9K**Ω.**
3. Pickup coil (P/C)

➢ Remove the rear wheel

■ Removal

A. Remove the seat assembly; disconnect the Lambda sensor connector.

Tool: 10” T-type wrench

B. Remove the exhauster assembly; keep the Lambda sensor body not be collided during removal.

Tool: 12” T-type wrench

C. Remove the axle cover.

Tool: Slotted screwdriver

D. Cautiously remove and lay the brake caliper and clips on the brake oil hose. Do not press the brake lever with the caliper separated from the brake disk.

Tool: 12” & 10” T-type wrenches

E. Remove screws on the shock absorber support and nuts on the rear axle.

Tool: 12” T-type wrench; 24” socket wrench; air wrench

F. Remove screws on the rear fork and the fender; take out the rear fork.

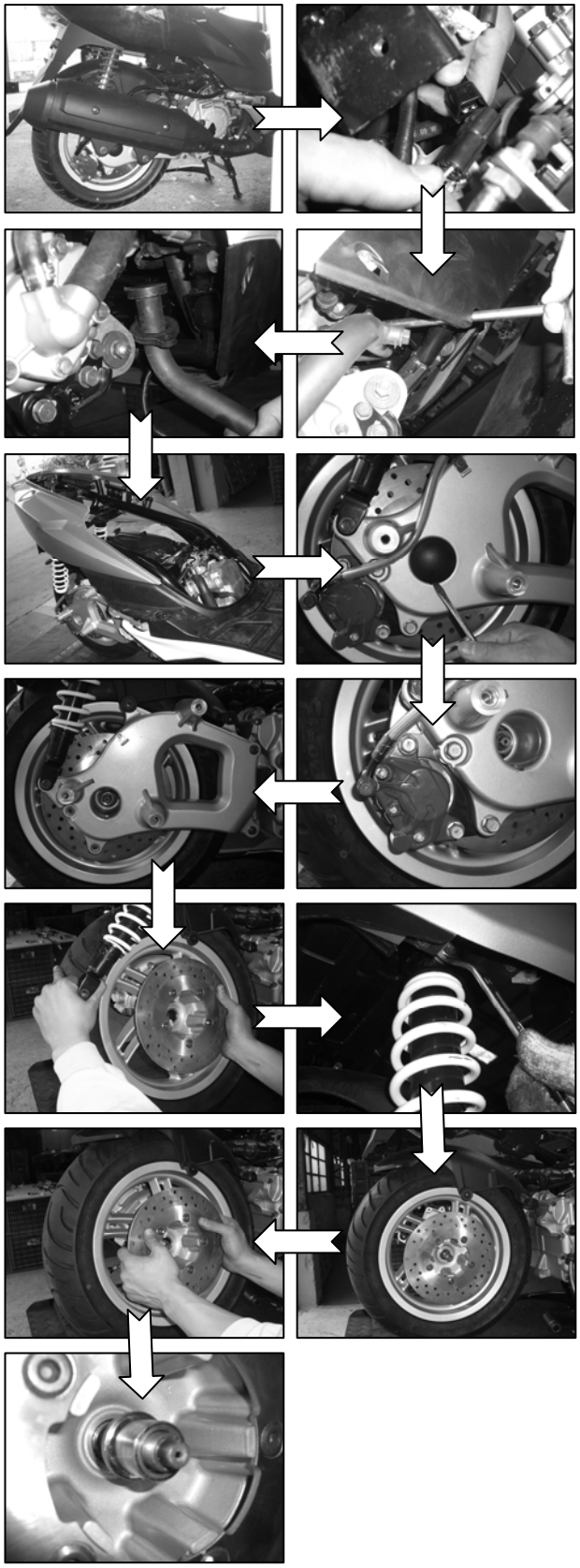
Tool: 12” & 10” T-type wrenches

G. Remove the rear shock absorber or the rear wheel cannot be removed.

Tool: 14” box spanner

H. Remove the shock absorber and the rear wheel assembly.

I. Cautiously preserve the spacer ring on the rear axle for installation later.



➢ Install the rear wheel

A. Install the spacer ring on the rear wheel.

B. Do not strike the Lambda sensor during installation of the exhauster.

C. Install all parts in a reverse order.

Letter of guarantee for the exhaust emission control system

Motive Power, Inc. warranties the exhaust emission control system conformable to standards of the Environmental Protection Administration, Executive Yuan, and effective under a user's correct use and maintenance.

Warranty period: Motorcycle in conformity with standards of the exhaust test, regular or occasional, demanded by the government during the first three years or 15,000km.

Pollution control element warranted: High-voltage ignition circuits, positive crankcase ventilation system, EMS, catalytic converter, and evaporative emission controller (EEC)

Standards for exhaust tests:

Model		Idle (RPM)	CO (%)	HC (PPM)	Section to be measured
-	5th stage motorcycle emission regulation	-	< 3.0	< 1600	Exhaust tail
AF-125	Recommended	1700±100	< 1.0		Post catalyst

Mechanism for pollution control:

1. Evaporative Emission Controller (EEC)
2. Catalytic converter
3. Positive crankcase ventilation system

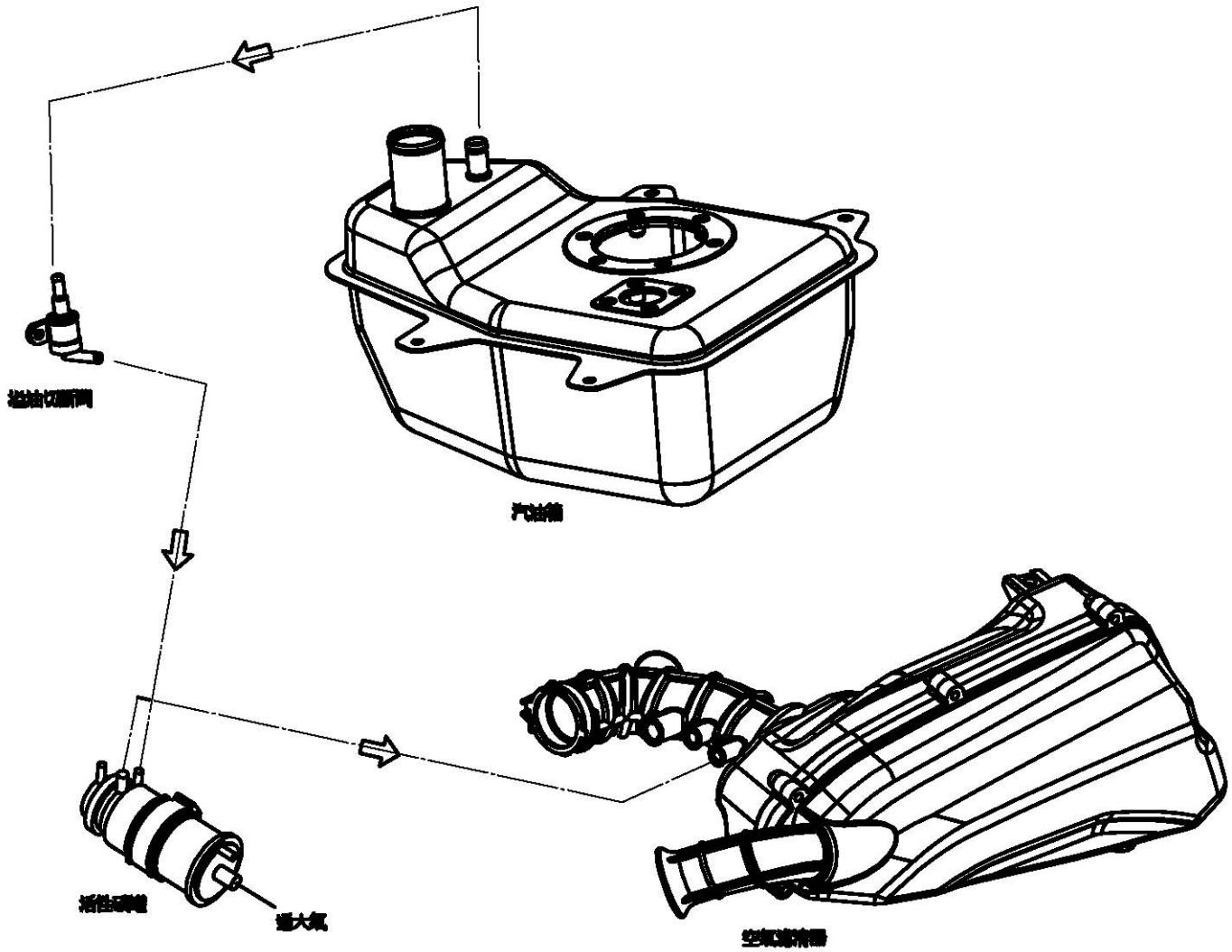
Maintenance and calibration of the exhaust emission control system

1. The catalytic converter fixed inside a motorcycle's exhauster cannot be removed for maintenance separately. To keep a catalytic converter's good performance, a motorcycle user shall correctly drive the motorcycle and regularly perform maintenance for the fuel & air supply systems and the ignition system correctly cleaned, checked and adjusted.
2. Refer to Section 3 for clean of an air filter.
3. Check the spark plug; remove deposited carbon; adjust the gap. Change the spark plug, if necessary.
4. Check the fuel system for chaps or jam of the fuel hose. Change the fuel hose, if necessary.
5. Check the exhauster for leakage. Tighten or replace any washer, if necessary.
6. Check and adjust the engine's idle speeds. Adjust the gap of the throttle cable.
7. Check the exhaust concentration at idling or make any adjustment to the exhaust system at any service station.

Incidents not warranted by Motive Power:

1. Use any gasoline except unleaded gasoline.
2. Re-equip or disassemble any parts of the engine without permission.
3. Do not perform maintenance according to the maintenance table or provide any maintenance-related evidence.
4. Car accident or vehicle damaged by external force due to any act of God or personal negligence.
5. The vehicle owner fails to perform an exhaust test at the service station.
6. Overload.
7. Fill unidentified or wrong fuel.

1. Evaporative Emission Controller (EEC)



Principle:

Make any HC inside the gasoline tank evaporated and absorbed by active carbon for pulse generated by the control valve during starting the engine and gasoline directed into the air filter and then the engine room for combustion.

2. Regular maintenance table for the exhaust emission control system

Item	Content	First 300km (1 month)	Mileage or Months					
			2,500km (3 months)	6,000km (6 months)	9,000km (9 months)	12,000km (12 months)	13,000km (15 months)	15,000km (18 months)
Valve clearance*	Check and adjust the valve clearance for the engine being cooled down.	○		○		○		○
Spark plug	Check the spark plug. Adjust the clearance and clean the spark plug. Change the spark plug, if necessary.		○	○	○	○	○	○
Positive crankcase ventilation / exhaust backflow device*	Check the vent pipe for chaps or jam. Change the vent pipe, if necessary.			○		○		○
Fuel system*	Check the vent pipe for chaps or jam. Change the vent pipe, if necessary.			○		○		
Air filter*	Clean or change the air filter, if necessary.		○	○	○	○	○	○
Evaporative Emission Control system*	Check the control system for any damage or change it, if necessary.			○		○		
Exhauster system*	Check the exhaust for leakage. Tighten or change any washer, if necessary.			○		○		
Idle speed*	Check and adjust the engine's idle speed.	○	○	○	○	○	○	○
EMS*	Check each sensor's functions. (Model for EMS only)	○	○	○	○	○	○	○

- *: Service station designated by motive Power only.
- **R**: Part changed every 10,000km or checked every 5,000km in view of drive safety.
- To keep a motorcycle's good performance, a motorcycle driven in any disadvantageous environment such as dust shall be maintained according to a short cycle.

3. Occasional maintenance table for the exhaust emission control system

Item	Content
Removal of deposited carbon in the ignition system	Any maintenance or check is recommended for ignition failure, engine fire, engine overheated, etc. obviously and constantly occurring. Remove deposited carbon on the cylinder head and the piston top or in the exhaust system in the event of the engine's power substantially dropped for the mileage between 5,000 and 10,000km.

*: PGO dealer only